R-WD-15-13

STATE OF NEW HAMPSHIRE

Response to Public Comment on the Draft Consolidated Assessment and Listing Methodology for the 2014 Section 305(b)/303 (d) Surface Water Quality Assessments

October 14, 2015

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Response to Public Comment on the Draft Consolidated Assessment and Listing Methodology for the 2014 Section 305(b)/303 (d) Surface Water Quality Assessments

STATE OF NEW HAMPSHIRE
DEPARTMENT OF ENVIRONMENTAL SERVICES
29 HAZEN DRIVE
CONCORD, N.H. 03301

CLARK B. FREISE
ASSISTANT COMMISSIONER

EUGENE FORBES, P.E.
DIRECTOR
WATER DIVISION

Prepared by:
Ken Edwardson

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On August 16, 2013, the New Hampshire Department of Environmental Services (NHDES) released the 2014 305(b)/303(d) Comprehensive Assessment and Listing Methodology (CALM) for public comments. Downloadable copies of the draft list were made available on the NHDES website for review (http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm) (NHDES, 2012a). In addition, the following organizations/agencies were notified by email:

Appalachian Mountain Club
Audubon Society
Center for Biological Diversity
Connecticut River Joint Commissions
Conservation Law Foundation
County Conservation Districts
DPW Directors of the MS4 Communities
Great Bay Municipal Coalition
Lake and River Local Management Advisory Committees
Maine Department of Environmental Protection
Manchester Conservation Commission
Massachusetts Department of Environmental Protection
Merrimack River Watershed Council
National Park Service
New England Interstate Water Pollution Control Commission
NH Department of Health and Human Services
NH Coastal Program
NH Rivers Council
North Country Council
Regional Planning Commissions
Society for the Protection of National Forests
Natural Resources Conservation Service
The Nature Conservancy
Upper Merrimack River Local Advisory Committee
US Environmental Protection Agency
US Geological Survey
US Fish and Wildlife Service
US Forest Service
University of New Hampshire
Vermont Department of Environmental Conservation
Volunteer Lakes Assessment Program
Volunteer Rivers Assessment Program
Water Quality Standards Advisory Committee

On Monday, September 9th, 2013 from 1:00-3:00 pm, NHDES conducted a public informational meeting regarding the draft 2014 Consolidated Assessment and Listing Methodology (CALM). This session was held at the NHDES office located at 29 Hazen Drive, Concord. Interested parties were encouraged to review the draft CALM before this meeting. Comments were then accepted in writing prior to the close of business Friday, October 11th, 2013.

The following sections contain the comments received, NHDES's responses to comments, and supporting information. The sections are organized as follows:

A. Response to Public Comment (Note: This section contains NHDES's responses to all of the comments received. The responses are organized by reference number. A reference number refers to a specific section of a comment letter in Section B.)

B. Public Comment on the Draft 2014 Comprehensive Assessment and Listing Methodology (Note: This section contains the full text of all comments received. Each individual comment in the letters has been assigned a reference number. The responses in Section A are organized by reference number.)

C. Comments received and their attachments are on the department's FTP site;

1. Go to this address using a web browser: ftp://199.192.6.23/DES/wmb//Water Quality/305B_303D/2014/CALM_Comments
2. A the login window, click on the box in the lower left hand corner labeled "Login Anonymously".
3. The User name will then be automatically filled in with the word "Anonymous".
4. Type in your email address in the Email Address block.
5. Then click on the Log On button.

Table 1. Comment Letters Received By NHDES with designated Comment Letter Number

COMMENTER	RECEIVED	COMMENT #
Amherst - Bruce W. Berry - Director of Public Works	Oct 11, 2013	1
Danville - Bruce Caillouette, Road Agent	Oct 11, 2013	2
Goffstown - Carl Quiram, PE, PWLF, Env-SP Public Works Director	Oct 11, 2013	3
Great Bay Municipal Coalition (no formal signature or indication of which municipalities) received from Keisha M. Sedlacek, Esq. Hall & Associates 1620 I Street, NW Suite 701 Washington, DC 20006 Ph.: 202.463.1166 Fax: 202.463.4207 E-Mail: ksedlacek@hall-associates.com	Oct 11, 2013	4

Manchester - Ricardo Cantu - Highway Department, Environmental Protection Division, Superintendent	Oct 11, 2013	5
Merrimack - Richard S. Seymour, Jr. - Public Works Department - Director	Oct 11, 2013	6

A. RESPONSE TO PUBLIC COMMENT

COMMENT # 1: Amherst - Bruce W. Berry - Director of Public Works

***DES RESPONSE* to 1- 1, 1- 4**

The comments refers to the report calculating the "Total Maximum Daily Load for Baboosic Lake, Amherst, NH" and states that there are errors in the document (http://des.nh.gov/organization/divisions/water/wmb/tmdl/documents/baboosic-lake.pdf). The CALM does not determine how Total Maximum Daily Loads (TMLD) are calculated. In general, NHDES has a rigorous approach to quality assurance for data in its Environmental Monitoring Database, however, as the commenter notes, we cannot take into account data which is not brought to our attention. This comment will be passed along to the TMDL program.

***DES RESPONSE* to 1- 2**

The CALM is a translator document that describes in detail how measured water quality data is compared to the numeric and narrative water quality criteria in Env-Wq 1700 and RSA-485-A:8. The CALM is not a, "*Water Quality Standard*". Some people and organizations do use the CALM as kind a "*Testing Guidance*", as the assessment methodologies can determine the character of data needed to make a valid assessment. Some example methods include but are not limited to; core parameters for each Designated use (i.e. bacteria for swimming use), minimum number of samples, maximum age of samples, how older data is treated, when samples must be taken (seasonality, time of day, flow, etc.), where samples are collected (depth profiles, to compare with older data, etc.), and how multiple samples will be treated.

***DES RESPONSE* to 1- 3**

The version of the Assessment Database that the department uses to bundle assessment outcomes for transmittal to EPA is several versions old. However, (1) this database has no bearing whatsoever on how assessments are conducted and (2) the version used by the department is a format accepted and usable by EPA for upload into the national database.

***DES RESPONSE* to 1- 4**

See response to 1- 1.

***DES RESPONSE* to 1- 5**

Probabilistic assessments are a sampling approach wherein a portion of the population is evaluated through probability (or random) sampling. Random sampling ensures that no particular portion of the population being sampled is favored (or biased) over another. Results of sample surveys can be used to make statistically based inferences (i.e., probabilistic assessments) about the condition of the population as a whole (i.e. all waters of the state) but provide little data about a specific waterbody.

The PDF of the CALM that resides on the web includes the section on probabilistic assessments and was successfully downloaded by other reviewers. Additionally, probabilistic assessments have no bearing on any specific waterbody assessment, therefore no comment period extension was issued.

***DES RESPONSE* to 1- 6**

The watersheds of entire country are broken up into a hierarchal system of numeric coding called Hydrologic Unit Codes (HUC) (http://nhd.usgs.gov/wbd.html). At the coarsest level, HUC-01 (i.e. a HUC2), Describes all waters that drain to the Atlantic ocean from the Gulf of Maine down to Long Island Sound. When you drill down in the coding, the Merrimack basin is Described by HUC-0107 (i.e. a HUC4). The system goes on to Describe HUC6s, HUC8's, HUC10's, and finally HUC12s. When the original Assessment Units Identifiers (AUIDs) were built for the 2002 assessment cycle, the department used the HUC12 value as part of the primary identifying key in the database used to track assessments. When the Natural Resources Conservation Service (NRCS) was in charge of the watershed HUC system, they made some coding changes. For example, what we originally knew as HUC12=010400010206 is now called HUC12=010400010306 in the National Watershed Boundary dataset. This note was placed in the CALM to assist those that might be conducting GIS mapping and noticed those changes. As the changes have no bearing on where waterbodies exist, how they flow, and how assessments are conducted no comment period extension was issued.

***DES RESPONSE* to 1- 7**

The New Hampshire Water Quality Standards Advisory Committee (WQSAC) on Designated Uses (DU) summed it up nicely when they said,

> *The Clean Water Act requires States and Tribes to Designate appropriate uses for water bodies to be achieved and protected. These so-called "designated uses" represent the range of activities that the States want to restore or maintain for the water body. Designated uses can be activities that directly benefit humans, for example clean water for recreation, or attributes that provide indirect ecosystem services, such as supporting aquatic organisms. All Designated uses require some level of protection through water quality criteria. The Clean Water Act requires that States include recreation in and on the water as well as protection and propagation of fish shellfish and wildlife in the list of Designated uses for all water bodies except under special circumstances. States can add other Designated uses as deemed appropriate. (summary text from WQSAC Classification Subcommittee, reported to WQSAC, June 6, 2011)*

Some DUs are specifically spelled out and some may be inferred by the presence of criteria in the statute and regulations that are Designed to protect the use. Examples are given below:

RSA 485-A:8,I regarding Class A waters: Includes fresh water bacteria criteria Class A waters and for Designated beaches. It also states that the "… waters of this classification shall be considered as being potentially acceptable for water supply uses after adequate treatment". This clearly indicates that DUs in Class A waters include primary contact recreation (as it

includes bacteria criteria) and drinking water after adequate treatment. The fact that no discharges of sewage or waste is allowed implies that it is intended to protect other uses such as aquatic life, fish consumption and wildlife.

RSA 485-A:8,II regarding Class B waters: Includes criteria for dissolved oxygen, bacteria for Class B waters and Designated beaches, and pH. It also states that the "waters of this classification shall be considered as being acceptable for fishing, swimming and other recreational purposes, and, after adequate treatment, for use as water supplies." This clearly indicates that DUs in Class B waters include primary contact recreation (as it includes bacteria criteria), aquatic life (as it includes DO and pH criteria), secondary contact recreation (based on reference to other recreational purposes) and drinking water after adequate treatment.

RSA 485-A:8,V regarding Class B tidal waters includes bacteria standards for swimming and states that those "… tidal waters used for growing or taking of shellfish for human consumption shall, in addition to the foregoing requirements, be in accordance with the criteria recommended under the National Shellfish Program Manual of Operations, United States Department of Food and Drug Administration". This clearly indicates that Designated uses in Class B tidal waters include swimming (primary contact recreation) and shellfishing (aquatic life and shellfishing).

The department plans to more clearly articulate the DUs in the next update of Env-Wq 1700 based on the statutory intent.

***DES RESPONSE* *to* 1- 8**

While the department believes that additional sample should occur after the completion of a management project to verify the effectiveness of that project, the CALM cannot beseech someone to conduct additional sampling. The remainder of the question/comment for the commenter does not pertain to the CALM.

***DES RESPONSE* *to* 1- 9**

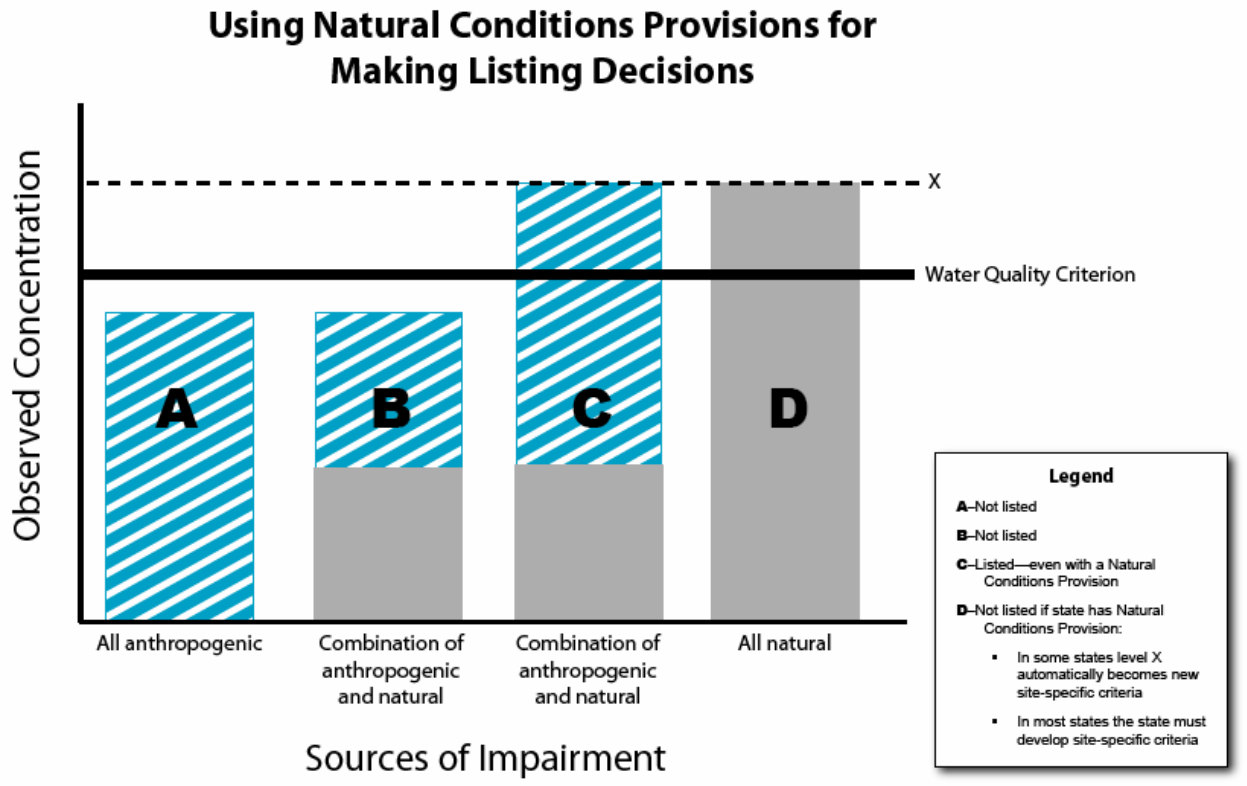
Env-Wq 1702.29 "Naturally occurring conditions" mean conditions which exist in the absence of human influences.

Env-Wq 1703.03 General Water Quality Criteria

(a) The presence of pollutants in the surface water shall not justify further introduction of pollutants from point or non-point sources, alone or in combination.

For a water quality exceedance to be considered natural, there must be an absence of any anthropogenic contributors and poor water quality does not justify further degradation. This is in keeping with the "shall not cause or contribute" provisions of the Clean Water Act (40 CFR 122.44) for discharges. This concept is illustrated in the figure below taken from the 2008 EPA

Assessment Listing Guidance (EPA, 2006). As such, in a developed landscape it is an exceedingly rare watershed for which we can say that the entire load of a pollutant is solely from natural sources.



Column A – The waterbody receives only anthropogenic pollutant loadings. The waterbody does not have to be included on the 303(d) list or placed into Category 5 because the applicable numeric criterion is not exceeded.

Column B – The waterbody receives pollutant loadings from both natural background and anthropogenic sources, but because the applicable numeric criterion is not exceeded, the waterbody does not have to be included on the 303(d) list or placed into Category 5.

Column C - The waterbody receives pollutant loadings from both natural background and anthropogenic sources. The applicable numeric criterion is exceeded, and therefore, the waterbody is considered impaired and belongs the 303(d) list or Category 5.

Column D - The waterbody receives pollutant loadings from only natural background sources, and the applicable numeric criterion is exceeded. The waterbody is considered impaired and belongs on the 303(d) list or Category 5 unless the State's water quality standards include a natural conditions provision consistent with the standards provision quoted above
(EPA 2008 Listing Guidance
http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/2008_ir_memorandum.cfm)

There is no single process to determine that a source is solely natural. Rather there are some guiding concepts that differ by specific parameter, waterbody type, watershed location, time of year, and the other variables that are considered in base assessment of data in the CALM. In order to determine whether all sources are natural, the following data would be needed:

1) location(s), timing, magnitude, frequency, and duration of threshold exceedences;
2) presence of clearly identifiable natural source(s), most likely through bracketed sampling;
3) timing of samples exceeding thresholds in terms of flow, season, weather, and time of day amongst other possibilities from the identified source(s); and
4) examination of both the near and distant watershed characteristics in terms of landuse, pipes, historic activities, and other variables relevant to the case.

The commenter is correct that if someone wants to make the case that an impairment is caused by natural sources, they would need to work with the department to collect the information Described above.

***DES RESPONSE* to 1- 10**

The "Level of Information Descriptions for Data Quality", Table 3-8 of the Draft CALM made its first appearance in the 2002 CALM. It originally provided, and continues to provide, a subjective Description of the datasets we anticipate could be submitted to the department. In practice, we have found that those collecting data that might be considered "Low" or "Fair", simply do not submit their datasets to the department for inclusion in the biennial assessments. As there is ample opportunity for those datasets to be submitted, and if they are submitted, the department would use them for screening purposes not for final assessments.

Regarding the data collected through the Volunteer Lake Assessment Program (VLAP) and Volunteer River Assessment Program (VRAP), this has always been of Good to Excellent quality. This quality is validated by the following practices: annual training of volunteers; self-audits of volunteers on field sampling; department audits of volunteers on field sampling; 10% field replicates for Quality Assurance/Quality Control (QA/QC) evaluation; sample level meter calibrations with the recording of relevant meter QA/QC validation metrics; computer entry of field by one individual; and checks of data entry by a second individual. Using these procedures, VLAP and VRAP data is some of the most robust data available.

The procedures and Quality Assurance Project Plans (QAPPs) created by these programs are rigorous enough that they are frequently adopted by entities in the regulated community for their own sampling to generate the data used in regulatory actions.

***DES RESPONSE* to 1- 11**

The department is interested in all parameters in the water quality standards and indicators for the water quality standards both identified in the CALM or otherwise identified by the public. As noted in the " Guidance for Submittal of Surface Water Data / Information" sent out on September 18, 2013 (http://des.nh.gov/organization/divisions/water/wmb/swqa/documents/2014-guid-submit-data.pdf). The department requests that the applicable Site Specific Project Plan (SSPP), Standard Operating Procedures (SOPs), and/or Quality Assurance Project Plan (QAPP) be submitted along with any dataset.

QA/QC is the responsibility of the program which collects the water quality information. As such, it is critical that we understand procedures applied in the authentication of the dataset.

The commenter refers to the shifting of a "financial burden." The department believes that this statement refers to the discussions revolving around EPA's MS4 draft permit. The CALM Describes the data need and process to assess a given waterbody. The CALM makes no statements about who should conduct such sampling. That is beyond the scope of the CALM.

It is unclear to the department what the commenter finds to be "dangerous" about the following sentence from the above-referenced Data Submittal Guide;

> "In general, scientifically sound and defensible evidence is needed to determine if a waterbody is meeting water quality standards or is impaired. Evidence that does not meet these criteria, however, is still useful as it provides a preliminary sense of water quality that can be used to guide future monitoring efforts/investigations Designed to fill data gaps needed to make a final assessment."

Similar language exists in section 3.3.10 of the CALM;

> "Data or information that is assigned a Low level is not considered defensible for use in final assessments. Such data, however, can and is used for making preliminary or screening level assessments, which help guide future monitoring efforts."

The commenter should recognize that both of these passages indicate that lower quality data is used to make only preliminary, not final, assessments.

***DES RESPONSE to* 1- 12**

The CALM specifies that in instances where older data indicates impairment, removal of that impairment requires adequate new data under similar or more limiting conditions indicating support. All data is considered and all knowledge of changes in the stressors to a system are considered when deciding whether a waterbody is kept as impaired or shown as fully supporting a particular indicator. If there is a defined change in water quality corresponding to particular activity, the samples in those two time periods would be treated independently.

The commenter did not specify the particular parameters they are concerned about. However, from the content of their comment we have inferred that their concern relates to the chlorophyll-a and total phosphorus indicators (Section 3.2.4, Indicator 7 in the draft CALM). The correct forum for comment on a waterbody's assessment status is when the draft 303(d) is published for public comments. In the case of Baboosic Lake, the chlorophyll-a and cyanobacteria impairments to protect the swimming Designated use were added to the 2006 303(d), then in 2010 the chlorophyll-a and total phosphorus impairments to protect the aquatic life use were added. The development of the 303d List contains opportunities for public comment steps with the CALM and then the Draft 303(d) List. The 303(d) is a federal requirement that is not final until approved by EPA. Therefore, any appeals of final approved listing decisions would go to EPA and follow the federal appeals process. In 2010 the Baboosic Lake Total Maximum Daily Load (TMDL) for nutrients was completed in draft form, published for public comments, finalized (January 2011), submitted to EPA, and approved by EPA (May

2011) for chlorophyll-a and total phosphorus meaning that those particular impairments are no longer on the 303(d).

In each subsequent assessment cycle, the department re-evaluates assessment determinations, keeping in mind the activities that have occurred to remedy a particular issue. Further, the department routinely re-evaluates dataset between formal assessment cycles when new information is brought to light or a particular project comes up. Relative to Baboosic Lake, the department coordinated with the Nashua Regional Planning commission and the University of New Hampshire Lay Lakes Monitoring Program (UNH LLMP) to receive additional monitoring data collected between 2007 and 2013. Evaluation of that data indicated that although improved, the lake did not yet meet the indicator thresholds.

***DES RESPONSE to* 1- 13**

The department agrees that assessments must be based on sound data.

COMMENT #2: Danville - Bruce Caillouette, Road Agent

DES RESPONSE **to 2- 1**

Assessments are based on the most recent data available. Where older data indicates impairment, newer data must be collected under similar or more limiting, water quality conditions to supersede the older data. Nearly every data point used in the assessment process resides within the Environmental Monitoring Database (EMD) and is accessible to the public at http://www2.des.state.nh.us/OneStop/Environmental_Monitoring_Menu.aspx. Data that has been used in the assessment process contains a wealth of metadata from station locations, latitude/longitude, project and organization collecting the data, to analytical methods. As part of the assessment process, the project Standard Operating Procedures (SOP) are requested and reviewed, project Quality Assurance Project Plans (QAPP) where available are requested and reviewed, and/or the Site Specific Project Plan (SSPP) available are requested and reviewed. Only data sets that contain defensible data are used in the final assessments.

DES RESPONSE **to 2- 2**

Assessments are based on the most recent data available. Where older data indicates impairment, newer data must be collected under similar, or more limiting, water quality conditions to supersede the older data. In some instances the alignment of the needed samples and the limiting condition does not occur but every few years.

DES RESPONSE **to 2- 3**

Regarding 'Natural' see response to **1- 9**

DES RESPONSE **to 2- 4**

The comment is not specific to the CALM, however, the data used for assessments are used for many purposes beyond regulatory determinations.

DES RESPONSE **to 2- 5**

The department agrees that assessments must be based on sound data and makes extensive efforts to determine assessment status in a transparent manner.

COMMENT #3: Goffstown - Carl Quiram, PE, PWLF, Env-SP Public Works Director

***DES RESPONSE* to 3- 1**

The comment does not require a response.

***DES RESPONSE* to 3- 2**

When originally developed, assessment units were spatially defined to be approximately homogenous from a water quality perspective. The defined assessment units aim to strike a balance between so large that samples in one section are unrepresentative of the whole and so small that samples define extremely small areas and the process become unmanageable. The flow of water, and fish and other aquatic life that depends on it, do not respect political boundaries, so assessment units often extend across jurisdictions.

***DES RESPONSE* to 3- 3**

The Designated use Described as wildlife comes directly from the Clean Water Act Section 101(a)(2) (see response to comment 1- 7) and is further echoed in Env-Wq 1701.01,

> "Purpose. The purpose of these rules is to establish water quality standards for the state's surface water uses as set forth in RSA 485-A:8, I, II, III and V. These standards are intended to protect public health and welfare, enhance the quality of water and serve the purposes of the Clean Water Act and RSA 485-A. These standards provide for the protection and propagation of fish, shellfish, and wildlife, and provide for such uses as recreational activities in and on the surface waters, public water supplies, agricultural and industrial uses, and navigation in accord with RSA 485-A:8, I and II."

At this time, there are no CALM indicators in place to evaluate whether a waterbody does or does not meet the wildlife Designated use. The department is open to suggestions from the public and other state agencies. At some point in the future, a wildlife Designated use CALM indicator may be established which, like the rest of the CALM, would be submitted for public comment prior to use.

***DES RESPONSE* to 3- 4** (and **3- 11**)

The CALM Describes two major categories for "threatened" of which only the second exists in the 2014 assessment cycle. Those two categories are:

- Waters which are expected to exceed water quality standards by the next listing cycle (every two years), of which none currently exist: and/or,
- Waters that do not have any measured in-stream violations but other data indicate the potential for water quality violations [i.e. see Sections 3.1.20 (predictive models) and 3.1.21 (NPDES permit effluent violations)].

The first item covering the inclusion of threatened waters on the 303(d) List is required under 40 CFR 130.7. The text, "Waters which are expected to exceed water quality standards by the next listing cycle (every two years)..." comes from EPA's document "Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act" (July 29, 2005, http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/2006IRG_index.cfm). "Expected to exceed" would

only be used in cases where there is a sufficient water quality data to calculate a statistically significant degradation trend and the projection of that trend two years forward in time results in predicted water quality worse than the applicable water quality indicator. Again, while this provision exists in the CALM, no such impairments currently exist and, if such a new impairment were proposed, like the rest of the draft 303(d), the impairment would be submitted for public comment prior to final 303(d) submittal.

The second bullet above, "Waters that do not have any measured in-stream violations but other data indicate the potential for water quality violations" is Described with additional details in Section 3.1.20 covering predictive models and Section 3.1.21 covering NPDES permit effluent violations. The predictive models (Section 3.1.20) must be calibrated and verified using field data so although there may be no data at the limiting condition, field data is used in the calibration and verification of the model. Like all new 303(d) Listings, these determinations would go out for public comment. Regarding the NPDES discharges, the CALM further states that only discharges in “significant non-compliance” will be flagged as impaired. Significant non-compliance (SNC) is defined as effluent concentrations of 20 to 40 percent above permitted limits depending upon the parameter in question. For most of the parameters in that lead to impairments based upon the SNC determination, the 40% exceedence of the permit limit applies. It should be noted that impairments triggered by the SNC determination are not on the 303(d) list but rather considered category 4B as there is already an enforceable permit in place that is expected to result in the Water Quality Standards being met.

DES RESPONSE to 3- 5

The table (3-6) provided under Section 3.1.5 is provided as a supplement to the detailed indicators in Section 3.2 to define when a parameter fully meeting threshold is considered good 'G' or marginal 'M', when insufficient data suggests potential support 'PAS' or potential non-support 'PNS', and when an impairment is considered marginal 'M' or severe 'P'. For example, Section 3.2.2, Indicator 1, Describes in detail how bacteria data is compared to the water quality standards for assessment purposes and defines under what instances a waterbody is considered impaired. Table 3-6 under ADB Category '4A' Describes when an impairment based on the assessment per Section 3.2.2, Indicator 1, would be considered marginal '4A-M' verses severe '4A-P'. In that case, if Section 3.2.2, Indicator 1 indicates impairment, then Table 3-6 says that if, "...there is at least one magnitude of exceedance of the geometric mean or there are two or more exceedances of the single sample criterion with at least one exceeding the MAGEX;" the impairment would be considered severe. In the case of bacteria, the MAGEX is set at two times the applicable water quality criteria.

DES RESPONSE to 3- 6

Regarding 'Natural', see response to **1- 9**

DES RESPONSE to 3- 7

In cases where there is no 'new' data, the department cannot delist purely based on data age. Generally, new impairments are not added based on older data. The department will be

exploring the addition of attributes to the watershed report cards that would tell the reader the age of the available data at the individual parameter level.

DES RESPONSE **to 3- 8** (also see **6- 5**)

Both of the referenced comments are in regards to how analytical results that are below detection limits (BDL) are used in the assessment process. The common practice in scientific data analysis is to apply a value of one-half the detection limit for additional analysis and if those BDL samples make up less than 10 percent of the sample population, those samples are considered to not skew in final calculated metrics. Three numeric substitution cases of potential concern to the commenter are addressed below; single samples BDL, total phosphorus samples BDL used in trophic class median calculations for lakes, and non-detect bacteria samples used in geometric mean calculations.

Section 3.1.12 of the draft 2012 CALM Describes the process wherein a sample that is BDL is only used to make either full support assessment if the detections limit is cleaner than the applicable threshold, or an insufficient information assessment if the detection limit is in excess of the indicator threshold.. For full support assessment, the absolute value becomes irrelevant for threshold comparison so long as the sample is demonstrated to be cleaner than the applicable threshold. In some cases the sample detection limit, and sometimes even one-half the detection limit, exceeds the applicable threshold leading to an insufficient information assessment. The automated, sample level comparisons to the thresholds includes a check of the data qualifiers to ensure that such samples are not used to make non-support determinations.

An evaluation of the data used in the 2012 assessments showed that at no time was the laboratory detection limit for total phosphorus above the applicable trophic class evaluation threshold Described in Section 3.2.4 Indicator 7 for any lakes in the state. The substitution of a zero value in the place of the BDL is not valid because all lakes contain some level of phosphorus. Since the detection limits are all below the applicable total phosphorus thresholds, the use of one-half the detection limit in the calculation of a given lake's median total phosphorus does not increase the likelihood of falsely calling a lake impaired when the lakes is cleaner then the threshold.

A small percentage of bacteria samples are logged into the Enviromental Monitoring Database as 0 cts/100mL. While this is fine for comparison the applicable single sample thresholds, one cannot calculate a geometric mean if any of the values is a zero. To work around the math issue without dropping the sample and only calculating based on the samples with detected bacteria, a value of 1 cts/100mL is substituted into the geometric mean calculation. Per RSA 485-A:8 a minimum of three samples go into a given geometric mean. This leads to the question, what is the risk that this substitute sample will falsely contribute to a geometric mean exceedance? The enterococcus geometric mean threshold for marine waters is the lowest geometric mean threshold in RSA 485-A:8 at 35 cts/100mL. If a single 1 cts/100mL substitution is made then the second and third samples must be 210 cts/100mL or higher to exceed the 35 cts/100mL threshold. It should be noted that 210 cts/100mL is more than two times the marine single sample maximum of 104 cts/100mL.

DES RESPONSE to 3- 9

With few exceptions, water quality standards are set to be met at all times and at all places not as an average condition. If there are two locations on a particular waterbody, one meets and one does not meet the water quality standards, then by definition there is a portion of the waterbody that is unhealthy for human health, aquatic life, or whatever the criteria are intended to protect.

There are a few cases where aggregate values are use as indicators of Designated use support including;

- geometric means for bacteria in all waters;
- median summer chlorophyll-a and total phosphorus in lakes;
- median water clarity (light attenuation coefficient) in the Great Bay estuary; and
- 90^{th} percentile chlorophyll-a in the Great Bay estuary.

Also see the response to comment 3- 2.

DES RESPONSE to 3- 10

It is rare that a waterbody is ever impaired with a single exceedence, though some have argued that if a sample has undergone appropriate QAQC procedures, then only a single exceedance is need to list a waterbody. In those cases, the department requires confirmation in the form of a second exceeding sample. The full details of the required samples for support and non-support determinations is provided in the CALM.

DES RESPONSE to 3- 11

See response to 3- 4.

DES RESPONSE to 3- 12

The department believes that the commenter meant to put a ‘not’ in the first sentence after the word ‘should’ and will address the comment in that context.

The 'source unknown' attribute has caused more than its share of confusion over the years. In fact the source of impairment is not a required field in the in the assessment process, per EPA guidance (EPA, 2005). Rather than haphazardly assigning blame in the assessment process, the department has been cautious in populating the 'sources' field for impairments in the assessment process. Because of this approach, there appear to be many impairments from unknown sources.

Assessments are principally based on whether a waterbody does, or does not, meet water quality criteria. Unless an indicator has an explicit 'unless naturally occurring' clause and we can demonstrate that no human source exists, the impairment is treated as a real condition which needs to be addressed. Category '4C' is reserved for impairments due to non-pollutants, that is, things to which one cannot assign a load such as invasive exotic weeds. Category '2' is reserved for parameters which meet water quality criteria.

DES RESPONSE **to 3- 13**

The department agrees that sound data and sound science is the foundation of the assessment process.

COMMENT #4: Great Bay Municipal Coalition (no formal signature or indication of which municipalities) received from;

Keisha M. Sedlacek, Esq.
Hall & Associates
1620 I Street, NW
Suite 701
Washington, DC 20006
Ph.: 202.463.1166
Fax: 202.463.4207
E-Mail: ksedlacek@hall-associates.com

DES RESPONSE **to 4- 1**
No response needed.

DES RESPONSE **to 4- 2**
Not a CALM comment. No response necessary

DES RESPONSE **to 4- 3**
Assessments are based on QA/QC'd datasets with particular focus on the critical periods for human health and aquatic life. The CALM makes no general '*presumptions'* regarding point source discharges as the commenter assumes except to note where they occur.

DES RESPONSE **to 4- 4**
Surface water quality assessments under sections 305(b) and 303(d) of the Clean Water Act are snapshots of the current water quality condition based on all readily available data. As such, the assessment process is meant to be an objective and dispassionate evaluation of data. The CALM provides transparency into the assessment process. This is a separate process from how management options are chosen by regulatory agencies. NHDES agrees with the commenter that it is important that the public have ample opportunity to review and comment on assessment determinations. To that end, the department has provided the details of all data used in the assessment process through multiple avenues including but not limited to the departments Environmental Monitoring Database OneStop data revival system, the NHDES 305(b)/303(d) Data Access mapper, and full assessment data extractions were done for all of the draft EPA MS4 impacted communities. Additionally, comments have been solicited for every 303(d) List since 2002.

The commenter also raises the issues of natural levels of pollution. Please see response to comment 1- 9 for a discussion regarding the concept of "natural".

DES RESPONSE **to 4- 5, 4- 6, 4- 7, 4- 8, and 4- 9**

The Great Bay Estuary constitutes approximately 86 percent (by area) of all New Hampshire estuaries. The Great Bay Estuary is a national treasure and a valuable resource to New Hampshire. It is one of 28 "estuaries of national significance" Designated by EPA under Section 320 of the CWA. The 2013 State of the Estuaries Report for the estuary (PREP, 2013) showed that the Great Bay Estuary has all the classic signs of eutrophication: increasing nitrogen concentrations, low dissolved oxygen, and disappearing eelgrass habitat. These symptoms of eutrophication have the potential to impair the Aquatic Life Designated use which would be a violation of the state water quality standards for nutrients (Env-Wq 1703.14) and biological and aquatic community integrity (Env-Wq 1703.19):

Env-Wq 1703.14

> (b) Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or Designated uses, unless naturally occurring.

Env-Wq 1703.19

> (a) The surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
> (b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.

In response to these worrisome trends, the department developed numeric nutrient thresholds for the Great Bay Estuary as numeric translators of the narrative standard to determine compliance with Env-Wq 1703.14 (NHDES, 2009). These translators were site-specific in that they only apply to particular assessment units in the Great Bay Estuary. Numeric translators were developed for chlorophyll-a, light attenuation (a general measure of water clarity), total nitrogen, and eelgrass cover. Translators were not needed for dissolved oxygen and dissolved oxygen saturation because the State already has water quality criteria for these parameters (Env-Wq 1703.07).

The numeric thresholds for the Great Bay Estuary were used as part of a stressor–response decision matrix to determine which water body segments should be included on the 2008, 2010, and 2012 (NHDES, 2012b) Section 303(d) lists of impaired waters for nutrients.

In March 2010, EPA initiated an independent peer review of the nutrient thresholds for the Great Bay estuary. The peer review process was administered by the environmental engineering consulting firm Tetra Tech through the Nutrient Scientific Technical Exchange Partnership and Support (N-Steps) program. The reviewers found the Great Bay nutrient thresholds were well explained and supported by appropriate literature and reasoning.

Due to a high level of interest from stakeholder communities, the nutrient thresholds were reviewed by another external peer review panel consisting of four independent specialists in the fields of estuarine water quality, modeling, dissolved oxygen, and eelgrass biology. The panel completed its work in February 2014. The questions to the panel were focused on

whether the report was sufficient to prove that nitrogen was the primary cause of ecological changes in the Great Bay Estuary.

The reviewers indicated that there was a reasonable basis for finding some parts of the Great Bay Estuary system impaired for eelgrass loss. The reviewers also agreed that nitrogen is an important factor related to eelgrass and other responses in the estuary. However, they concluded that the NHDES 2009 report did not adequately demonstrate that nitrogen is the primary factor causing eelgrass decline in the Great Bay Estuary because the report did not explicitly consider all of the other important, confounding factors in developing relationships between nitrogen and the presence of eelgrass.

As a result of a court approved settlement agreement, the department will cease using the nitrogen concentration thresholds from the NHDES 2009 Report (NHDES, 2009) to assess nitrogen impairments in its 2014 assessment. The CALM will be changed to reflect that the stressor-response matrix previously used to determine total nitrogen impairment status will not be used. In the 2014 assessment, the department will assess the parameters listed above (dissolved oxygen, chlorophyll-a, light attenuation, total nitrogen, and eelgrass cover) independently relative to their respective numeric or narrative water quality standards.

In the case of total nitrogen, the department is in the process of determining new assessment approaches. Because that process is incomplete, the department will utilize existing data for each assessment unit to make a determination of impairment status. For those assessment units where the data are clear, an assessment status will be determined and documented in the 303(d) list, and a Great Bay estuary addendum which accompanies the list. For those assessment units in which the impairment status is uncertain, the approach remains in a development phase and the final assessment of total nitrogen will be delayed until such time as a new approach is determined. Any new approach will become part of a future CALM which will be applied after opportunities for public involvement and an official comment period.

DES RESPONSE to 4- 10 and 4- 11

Nitrogen thresholds in the 2009 document are no longer in use. See response to comment 4- 5 to 4- 9.

The commenter's arguments regarding the assessment status of individual assessment zones should be reserved for comments on the draft 303(d) List when it is released.

The body of scientific knowledge indicates a causal linkage between nitrogen and dissolved oxygen (DO), due to growth and decomposition of algae. As decomposition is a major component in decreased DO, it is not surprising that is some cases, low DO did not temporally "coincide" with elevated algal growth. In fact, we have seen severe DO super-saturation at times of elevated algal growth. DO was documented to be related to nitrogen in the Squamscott River. Also, the wording of Env-Wq 1703.14 explicitly states that nutrient levels in the water body only have to "encourage" or "contribute to" cultural eutrophication to prompt action in Class B waters.

DES RESPONSE **to 4- 12**

See response to 4- 5 to 4- 9.

The CALM does not drive the Water Quality Standards but rather explains a methodology to interpreting water quality data for comparison to the Water Quality Standards. Nitrogen thresholds in the 2009 document are no longer in use.

The commenter's arguments regarding the assessment status of individual assessment zones should be reserved for comments on the 303(d) List.

DES RESPONSE **to 4- 13**

The department agrees that sound data and sound science is the foundation of the assessment process. Although a comment on the assessment rather than the CALM it should be noted that the department has gone to great lengths to include all available data. In fact, one of the delays in the 2014 assessment was due to the length of time required to get final 2013 data from UNH for the Great Bay estuary. This was done in good faith to ensure that all available data could be used in assessments.

DES RESPONSE **to 4- 14**

See response to comment 4- 5 to 4- 9**.**

DES RESPONSE **to 4- 15, 4- 16,**

While the department does not agree with the comment, another peer review was conducted as noted in the response to 4- 5 to 4- 9.

DES RESPONSE **to 4- 17**

The department has copies of the referenced documents and will use them in the assessment process.

DES RESPONSE **to 4- 18**

While the 2013 State of the Estuaries Report (2013 SOE) does not make specific reduction recommendations, it does plainly state that, "At this time the Great Bay Estuary exhibits many of the classic symptoms of too much nitrogen: low dissolved oxygen in tidal rivers, increased macroalgae growth, and declining eelgrass."

DES RESPONSE **to 4- 19**

This is not a CALM comment. However, as the State of the Estuaries report points out in the following quote, such a trend is not necessarily expected.

> *"Blooms of microscopic plants are episodic and variable in size depending upon factors such as weather. As a result, it can be difficult to detect trends in chlorophyll-a based on a monthly monitoring program which is how monitoring is currently conducted."(2013 SOE pg 16)*

DES RESPONSE **to 4- 20**

This is not a CALM comment. It should, however, be noted that the full text of the State of Estuaries Report reads,

> *"These efforts have led to recognition that a substantial increase in the abundance of nuisance macroalgae is an emerging problem for the bay and that increased monitoring and research effort is needed to better understand this issue." (2013 SOE pg 44)*

DES RESPONSE **to 4- 21**

This is not a CALM comment. The comment identifies the challenge in using DIN as a measure of loading. DIN is both rapidly taken up by plants and easily converted to other form of nitrogen in the estuarine system making trend analysis difficult. This is why total nitrogen is used as the CALM indicator.

DES RESPONSE **to 4- 22**

See response to 4- 5 to 4- 9.

DES RESPONSE **to 4- 23**

The commenter is in error. In the 1980-1981 survey there were 408.7 acres of eelgrass in Little Bay. The recent peak cited by the commenter was 48.2 acres in 2011 a mere 12% of its former extent, which does not indicate a rebound. Further, in 2013 eelgrass in Little Bay was back down to 0 acres.

DES RESPONSE **to 4- 24**

Commenters conclusion. No response necessary.

DES RESPONSE **to 4- 25, 4- 26**

The nitrogen thresholds developed in the 2009 document are no longer in use. See response to comment 4- 5 to 4- 9.

DES RESPONSE **to 4- 27, 4- 28**

The comment looks to infer there is no relationship between eutrophication, decreased DO, phytoplankton growth, and transparency because there are no Great Bay specific studies. The response by Drs. Richard Langan and Stephen Jones is strongly prefaced by a statement stating

that their data is not collected in a manner that can properly address the specific questions asked by the Mayors.

> *"Data generated from this framework [status monitoring programs] are not Designed to answer questions of cause and effect, source identification and other 'why' and 'how' questions; these require specific studies Designed to answer them or to address hypotheses. The second fact is that there have been few or no published studies Designed to answer these questions." (Feb 19, 2013 reply to the Mayors)*

In regards to the linkage between algal growth and DO, Drs. Richard Langan and Stephen Jones cite studies in 2005 and 2007 that were Designed to capture the DO uptake by algal respiration not decomposition. The reader is further referred to the response to 4- 19.

DES RESPONSE **to 4- 29**

This is not a CALM comment. This block is text introducing allegations 4- 30 to 4- 42 which are a collection of conclusions drawn by the commenter, not the words of those deposed.

DES RESPONSE **to 4- 30**

This looks to be an assessment argument, not a CALM comment.

DES RESPONSE **to 4- 31**

See response to comment **4- 19**

DES RESPONSE **to 4- 32**

In general, the CALM remains indifferent to the relative contributions and sources of causes to the impairment to a Designated use. Nuances apply where there is a "natural" clause (i.e. "except as naturally occurs") in the standard, or where there are enforceable measures in place to restore a Designated use, such as an administrative order for a CSO. In the language of the assessment process, the terms causes and impairments are synonymous. As is often the case when a Designated use is impaired, there may be multiple contributory factors to that impairment. In other words, if a water quality indicator, such as the dissolved oxygen with a limit of 5 mg/L is exceeded, it would listed as an impairment (i.e. cause) but there may be multiple sources to that impairment or the source(s) may remain undefined. In general, sources are only assigned where there is reasonable certainty. Also see responses to 3- 12, 4- 10, and 4- 11.

DES RESPONSE **to 4- 33**

The "initial analysis" done for the 2007 presentation cited in the comment is not the basis for the methodology used in the CALM.

DES RESPONSE to 4- 34

The CALM transparency thresholds are based on the 22% light transmission value which has been adopted by the EPA Chesapeake Bay Program Office. The 22% minimum transmission is a minimum needed for eelgrass survival, a higher percentage of light transmission would be needed for eelgrass to thrive or to restore eelgrass where it has been lost. This translates into the median Kd values as various restoration depths (Section 3.2.4, Indicator 9c). This threshold only applies in places in which eelgrass exists or has existed in the recent past. The threshold does not assume that exceedences will always result in the elimination of eelgrass habitat. As commenter points out, the situation with transparency is also related to depth and exposure at various tides. Certain areas may be more or less impacted by low Kd values but the physical properties of light extinction make the threshold appropriate across the variety of depths that exist in the estuary.

DES RESPONSE to 4- 35 and 4- 36

The light attenuation coefficient is a composite of all factors that diminish light transmittance through the water column. Controlable components include import and growth of chlorophyll-a and turbidity by direct inputs from non-point source loading from the watershed as well as resuspension within the system of both natural and human materials (which has been exacerbated by the loss of eelgrass). Since the respended material is composed of not solely natural sourced material, it is not considered “natural”. It should also be noted that if the transparency in the tidal rivers was naturally low, then eelgrass whould never have been able to survive, let alone recolonize. In in fact, historically, eelgrass has historically survived and thrived in the tidal tributaries .

Also see response to 1- 9.

DES RESPONSE to 4- 37

The commenter misrepresented the statement by Trowbridge. Mr. Trowbridge did not say that DO was naturally low. Further, it is not the role of the assessment process to parse out the relative contributions of factors that contribute to low dissolved oxygen.

(Comment 4- 37 matches the text below from the commenters Attachment 2)

> **15. Low dissolved oxygen (“DO”) is naturally occurring in the system and the causes of the periodically low DO is unknown.**
>
> **Q.** Can you tell me what kind of natural – what type of natural condition could cause low DO in the system? **A.** I think there are many, but I’m not sure exactly. *** **Q.** … How can we know at this point in time how much of that low DO is caused by algal growth versus other factors if we haven’t analyzed the other factors that affect DO in the system? **A.** We don’t have the information to do that analysis.
>
> Trowbridge Deposition Vol. 1 at 39 ln 10-14, 44 ln 21 – 45 ln 4.

DES RESPONSE to 4- 38, 4- 44 and 4- 45

These are assessment comments, not CALM comments.

DES RESPONSE to 4- 39

See response to comments 4- 5, 4- 6, 4- 7, 4- 8, and 4- 9.

DES RESPONSE to 4- 40

See response to comment 4- 5 to 4- 9 and 4- 32.

DES RESPONSE to 4- 41

Currently, the department uses macroalgae as a supplemental indicator, in fact the 2012 CALM reads

> "In addition, NHDES may consider published reports about eelgrass impacts due to the proliferation of macroalgae as supplemental information for eelgrass assessments." (2012 CALM, pg 59)

This is in keeping with a weight of evidence assessment approach to narrative criteria.

The commenter claims that there is no data showing the relationship between eelgrass loss and macroalgae growth. Comments provided by Dr. Art Mathieson of the University of New Hampshire (see Comment #2 from the response to comments on the 2012 Draft 303(d) reproduced in part below) clearly link increases in macroalgae blooms to increased nutrients.

> "*Prior to the 1980s no major algal blooms were apparent and the nutrient levels were much lower than today (cf. Mathieson and Hehre, 1981). During the past 2-3 decades the following macroalgal patterns have occurred along with increased nutrients:*
>
> - *"Extensive ulvoid green algae (Ulva spp.) or "green tides" (Fletcher, 1996) have begun to dominate many of these estuarine areas during the past 15-20 years, particularly within Great Bay proper (Nettleton et al. 2011). Such massive blooms of foliose green algae can entangle, smother and cause the death of eelgrass (Zostera marina) within the low intertidal/shallow subtidal zones (pers. obs. A C Mathieson). They primarily represent annual populations that can also regenerate from residual fragments buried in muddy habitats.*
> - *"Extensive epiphytic growths of seaweeds on eelgrass (Zostera marina) have also occurred during the past 15-20 years, particularly within Great Bay proper (pers. obs. A C Mathieson). These epiphytes, which are mostly filamentous red algae and colonial diatoms, may completely cover the fronds of eelgrass, limiting the host's growth and photosynthesis and compromising its viability*."

Macroalgae is but one of many factors that may have led to eelgrass loss.

DES RESPONSE **to 4- 42**

See response to 4- 5.

DES RESPONSE **to 4- 43**

Commenters conclusion.

DES RESPONSE **to 4- 44**

See response to 4- 38.

DES RESPONSE **to 4- 45**

Also see the response to 1- 9 and 4- 38.

The commenter suggests a weight of evidence approach for the 2014 CALM. There are several important elements to a weight of evidence approach. These elements include compiling data within reasonably homogeneous assessment zones; a suite of indicators and the accepted hypotheses for the relationships between nutrients and their effects; and a determination as to whether anthropogenic nitrogen has caused or contributed to the observed conditions of cultural eutrophication. The weight of evidence approach for the Great Bay Estuary has merit.

DES RESPONSE **to 4- 46 to 4- 54**

Currently, the department uses macroalgae as a supplemental indicator, in fact the 2012 CALM reads

> "In addition, NHDES may consider published reports about eelgrass impacts due to the proliferation of macroalgae as supplemental information for eelgrass assessments." (2012 CALM, pg 59)

This is in keeping with a weight of evidence assessment approach to narrative criteria.

DES RESPONSE **to 4- 46**

Macroalgae presence is considered in a weight of evidence approach to understanding the system responses to the nutrient stressors as macroalgae is one of the considered confounding variables. Macroalgae response to nutrients has been documented in the literature (Short '99, Hauxwell '03, McGarthery '07).

Additional data on macroalgae will be helpful to determine its level of impact in all parts of the estuary. Given that nearly all the eelgrass that once lived in the tidal rivers is now extirpated from those areas, macroalgae impacts in those tidal tributaries are unclear.

See Art Mattison 2012 303d comment and response to 4- 41

DES RESPONSE **to 4- 47, 4- 48**

See introduction to response for comment 4- 41**.**

Macroalgae has been noted on tidal flats because it moves with the tide and can be stranded on the flats at low tide. It has already been documented that most of the 137 acres measured in the 2007 survey were present in areas of former eelgrass habitat; hence macroalgae is considered in the weight of evidence.

The commenter cites a 40% rebound in Great Bay from 2007 to 2011. In 2007 there were 1,245 acres and in 2011 there were 1,623 acres for a 32% increase which still places the Great Bay well below the 2,495 acres mapped in Great Bay in 1996, the year used by PREP in setting the goals for Great Bay Estuary (not to be confused with the overall target of 2,900 acres based on areas mapped in the whole Great Bay Estuary system in 1996). Note that since 2011, there have been additional loses of eelgrass in the 2012 and 2013 datasets.

DES RESPONSE **to 4- 49**

See introduction to response for comment 4- 41**.**

The commenter draws an unsupported conclusion that under recent lower nitrogen levels, more macroalgae is growing. The commenter suggests that more macroalgae grows now under lower nitrogen levels then existed in the mid-1990s. As there were no measurements of macroalgae in the mid-1990s we find this argument to be without merit. Further, the only available nitrogen data from the mid-1990s is DIN not TN. The statement appears to rely on the Adams Point DIN dataset. DIN is rapidly taken up by macroalgae so lower DIN in recent years could be the result of macroalgae growth.

DES RESPONSE **to 4- 50**

See introduction to response for comment 4- 41**.**

The department appreciates the photos, however they were taken on a single date from a shoreline position such that the flats are difficult to see and there was no quantification of coverage. The Nettleton study was highly quantitative of coverage over the course of the year and the commenter's photos were taken from out on the flats. Additionally, macroalgae moves with the tide and can be stranded at a number of locations based on recent conditions. Note that Nettleton *et. al.* 2011 demonstrated inter-annual variability by species by site so the apparent low coverage on a particular date would be expected.

DES RESPONSE **to 4- 51**

See introduction to response for comment 4- 41**.**

DES RESPONSE **to 4- 52**

The commenter's conclusions. This does not appear to be a CALM comment as there were no TN criteria proposed for macroalgae.

DES RESPONSE **to 4- 53**

See introduction to response for comment 4- 41**.**

This comment appears to be an assessment outcome debate rather than an assessment method comment as macroalgae is not listed as an impairment in the Piscataqua River or Little Bay. As such, the comment as to whether the dominant species of macroalgae is native or invasive is not relevant.

DES RESPONSE **to 4- 54**

Controlling DIN loading may be on the list of appropriate management actions, however Total Nitrogen is the indicator of system eutrophication.

DES RESPONSE **to 4- 55**

See response to 4- 5, 4- 9**,** 4- 19, and 4- 27

The growth, life, and death of algae remains one of the confounding factors relative to the health of the estuary.

DES RESPONSE **to 4- 56**

There is no requirement in the assessment process that the state determine the exact relative contributions of loading sources to a waterbody. That is the role of a waste load allocation study. If some portion of the loading to a waterbody is not natural and assessment of that waterbody indicates that water quality criteria are not met, the waterbody should be assessed as impaired.

See responses to comments 1- 9*,* 3- 12, and 4- 4.

DES RESPONSE **to 4- 57 and 4- 58**

Nitrogen thresholds in the 2009 document are no longer in use. See response to comment 4- 5 to 4- 9.

DES RESPONSE **to 4- 59**

The commenter suggests that, "…*that a 20- 30% variation in eelgrass acreage from the median condition of 2150 acres will be considered in assessing whether or not eelgrass resources are stressed from natural or man-induced conditions*." The 2012 CALM currently uses a 20% threshold, the flexibility to differ from that threshold already exists, and data quality is considered in the assessment process. For the indicator for comparison to the historic coverage, the year to year variability in the system is addressed by using the median of the last three years.

DES RESPONSE **to 4- 60**

No response needed.

COMMENT # 5: Manchester - Ricardo Cantu - Highway Department, Environmental Protection Division, Superintendent

DES RESPONSE **to 5- 1**

It is not within the purview of the CALM to put constraints on the activities of department staff.

DES RESPONSE **to 5- 2**

Additional discussing of "naturally occurring" concepts are coved in the response to 1- 9.

In a case where samples are in excess of the applicable water quality criteria and that criteria has an, "...unless naturally occurring..." clause the sample would not be considered an impairment and therefore not a Category 4 parameter. To maintain transparency and help in future assessments, that parameter would be placed in Category 2-OBS as Described in Table 3-6. Category 2-OBS, named as an abbreviation for "observed effect" is Described in the table as,

> "Parameter exceeds water quality criteria due to naturally occurring conditions (Section 3.1.7) and but for the naturally occurring conditions the parameter would be marked as Category 4 or 5."

Regarding the Merrimack aluminum concentration, those comments should be made when the Draft 2014 303(d) is released.

DES RESPONSE **to 5- 3**

The text in Table 3-1 of the CALM is a partial quote from the water quality standards (Env-Wq 1700). Outstanding Resource Waters (ORWs) are ORWs regardless of their assessment status. While the suggested text addition is technically correct, it is not within the purview of the CALM to re-write the Water Quality Standards.

As noted in response to 5- 2 comments regarding the Merrimack aluminum concentration should be made when the Draft 2014 303(d) is released.

(Note that the commenter references table 3-1 in the draft CALM and that should have read table 3-2.)

DES RESPONSE **to 5- 4**

See response to comment 3- 4.

DES RESPONSE **to 5- 5**

See the response to comment 3- 4.

It is not the intent of this section of the CALM to predict all possible modeling scenarios and prescribe all possible validation practices for those models. Rather, the intent is to openly state that predictive models are a possibility. It is the expectation of the department that the details of any model and that models statistical validity would be readily available for scrutiny before a waterbody were to be added to the 303(d). Additionally, any new listing based on a model or otherwise would be open for public comments during the draft phase of the 303(d) list.

The remainder of the comments appear to be targeted at a particular NPDES permitting activity and EPA's process for setting permit limits. As such, those comments will not be addressed here because they are not related to the CALM.

DES RESPONSE **to 5- 6**

See the response to comment 1- 10.

While prescribing the exact acceptable errors for data to fall into a given "Level of Information" is a laudable goal, any such effort is greatly complicated by the hundred plus parameters pulled into the assessment process, the approximately 150 different projects which have been used in assessments, and the inter-annual difference that can occur as equipment and lab methods change. There are other safeguards in place to ensure that high quality data is used in final assessments without generating an entirely new tracking process.

The department has also reviewed data on the differences between clean techniques per EPA Method 1669 (EPA, 1995) and standard sampling techniques. That review was the basis for tables 3-32 and 3-33 in the CALM. Those tables account for moderate levels of contamination (i.e. the Contamination Concentration) that are likely to occur when clean techniques are not implemented and act as one of the safeguards in place to ensure that high quality data is used in final assessments.

Regarding specific datasets used in assessment, the commenter should raise those data questions with the next draft assessment.

DES RESPONSE **to 5- 7**

During the assessment process, the representativeness and quality of different datasets within an assessment unit are considered. Regarding specific datasets used in assessment, the commenter should raise those data questions with the next draft assessment.

DES RESPONSE **to 5- 8**

This issue is partially addressed in the response to 3- 9. In brief, most water quality criteria are to be met at all times and locations, not on the '*average*'.

There are several steps taken in the assessment process such that individual data points that do not represent the waterbody do not get used to make full-support or non-support determinations. In particular, within the depth profiles of lakes and impoundments, Section 3.2.4 Indicator 1 (regarding dissolved oxygen),

> "In Class A lakes, ponds, and impoundments waterbodies the bottom DO concentration shall not be used in assessments due to natural boundary layer conditions that result in decreased DO at the sediment to water column interface. Where the lake is greater than 3 meters deep, DO readings in the bottom 1 meter are not used. Where the lake is less than or equal to 3 meters deep, the deepest DO reading is not used."

and, Section 3.2.4 Indicator 2 (regarding pH),

> "In lakes, ponds, and impoundments the bottom pH shall not be used in assessments due to natural boundary layer conditions that result in increased carbon dioxide (CO_2) and depressed pH at the sediment to water column interface."

The intent of the 10 percent rule in the CALM and associated efforts to avoid assessments based on a single sample are intended to address possible sampling and analysis errors. Those methods recognize that sometimes a few data points are valid assessments of water quality.

DES RESPONSE **to 5- 9** (Also see response to comment 3- 10)

Between the 2004 and 2006 assessment cycles the department switched for a binomial approach to a straight 10% exceedance approach for the assessment of conventional parameters. This change reduced the number of exceedances needed to consider a parameter as impaired from three to two. While the comment alleges that this is a "...*66% change in criteria*..." it is important to note that this is by no means a change in criteria but a change in the number of samples exceeding the existing water quality criteria needed to consider the waterbody to be not meeting the existing criteria.

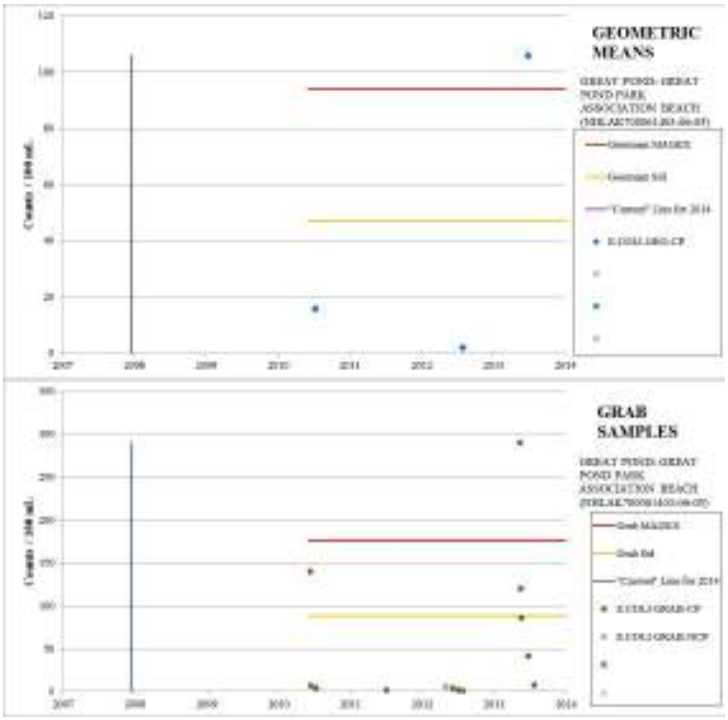
The commenter concludes their remarks of this topic by proposing modifications to CALM table 3-13 that would be more resource conservative (i.e. impairments based of fewer samples) than the existing method used in the CALM. For example, at 29 samples, the current CALM requires 3 exceedances for a waterbody to be considered for impairment while the commenter proposed table modification requires only 2 samples. Their final conclusion point is that, "*There is enough protection within the CALM to stick with the true 10% rule*", further arguing that the existing 10 percent rule is appropriate.

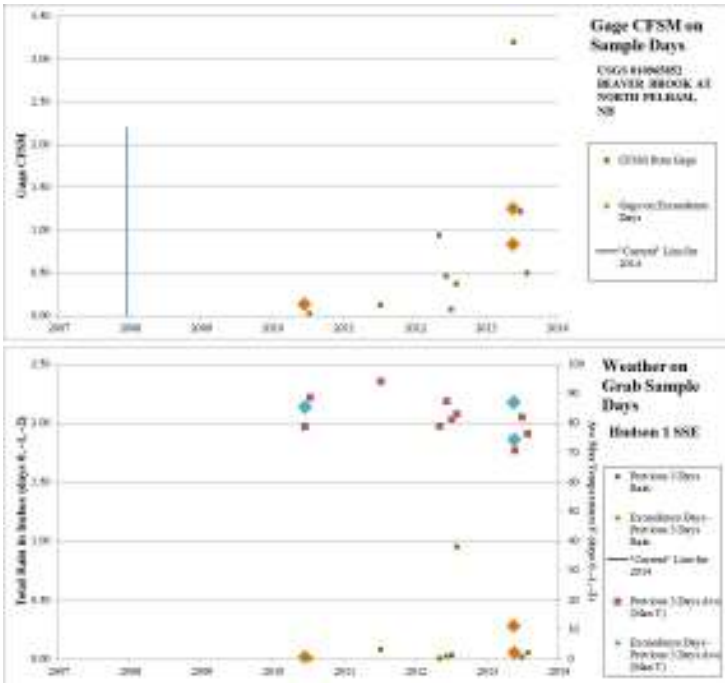
(Note that the commenter references table 3-2 in the draft CALM and that should have read table 3-13.)

DES RESPONSE **to 5- 10**

The commenter suggests that the MAGEX thresholds should not apply when some other, "...*reasonable explanation could be made for the large exceedence e.g. construction activity, high flows with river scouring velocities, field fertilization etc*." As the first and last suggested activities, "...*construction*..." and "...*fertilizer*..." are entirely of human sources they are

controllable and cannot be excluded from adherence to the water quality standards. There could be instances when the middle suggestion, "... *high flows...*" produces criteria exceedences and could invoke a "unless as naturally occurring" provision if it can be demonstrated that human factors are not contributing to that exceedence. To aid in that evaluation, NHDES has refined its methods used to look at datasets under consideration for impairment in the context of local flow, precipitation, and temperature. The new tool allows staff to look at the data for any waterbody paired up with one of 44 stream gages and one of 13 meteorological stations. As seen in the example below, the application of this tool allows NHDES to develop a better understanding of the conditions present when criteria are met and not met. This allows NHDES to address cases where unusual one-time events might lead to an indicator exceedence. Every effort is made to avoid impairment determinations based on a single sample or one-time event..





Notes:

E.COLI-GEO-CP = Escherchia coli geometric mean calculated from samples collected during the summer critical period.
E.COLI-GRAB-CP = Escherchia coli grab samples collected during the summer critical period.
E.COLI-GRAB-NCP = Escherchia coli grab samples not collected during the summer critical period.
"Current" Line for 2014 – Per the methodology outlined in the CALM, all data from this referenced data is considered 'current' unless. Available older data is provided for context. See the 2014 CALM for addition details.
CFSM = Stream flow in the normalized units of cubic feet per square mile of watershed area.

Regarding specific datasets used in assessment, the commenter should raise those data questions with the next draft assessment.

DES RESPONSE **to 5- 11**

See the NHDES response to comment 5- 5.

The modeling efforts of the Total Maximum Daily Load (TMDL) program is not within the purview of the CALM. Concerns with the TMDL should be addressed to the TMDL program.

DES RESPONSE **to 5- 12**

The department agrees with the commenter conclusion and does not use the probabilistic assessments to make any kind of "...*determination of watershed compliance*..." As stated in the CALM the purpose of the probabilistic assessment is as follows,

> "Probabilistic assessments are most useful for Section 305(b) reporting purposes because they can provide a general overall idea of the condition of an entire waterbody type (i.e., all rivers or lakes) which might otherwise be impossible to do using the census approach." (Draft CALM Section 3.1.27 paragraph 3)

and,

> "Probabilistic assessment results shall have no bearing on the Section 303(d) List other than the fact that samples collected for the probabilistic assessment can be combined with other samples within an assessment unit (AU) and assessed in accordance with this document (including the minimum sample size) to determine if the AU should be included on the Section 303(d) List." (Draft CALM Section 3.1.27 last bullet)

DES RESPONSE **to 5- 13**

The referenced 10% reserve assimilative capacity comes directly from the water quality standards Env-Wq 1700,

> Env-Wq 1708.08 (h) The above determinations shall take into account Env-Wq 1705.01 which requires the department to reserve no less than 10% of a surface water's assimilative capacity.

It is not within the purview of the CALM for rewrite the water quality standards for the state. (Note that the commenter references table 3-3 in the draft CALM and that should have read table 3-17.)

The commenter suggests additional language for the end Table 3-17 and comments that, "Chlor-a is the limiting concentration that drives nutrients." As the reverse is true, nutrients limit the growth of chlorophyll-a, it appears that the commenter wanted to illustrate that it is the chlorophyll-a indicator in lakes dictates whether nutrient levels are high enough to cause an impairment. The department agrees, and this is the underlying stressor-response premise for the Aquatic Life Indicator 7: Chlorophyll-a (Chl-a) & Total Phosphorus (TP) in Lakes. In the absence of high chlorophyll-a measurements, Indicator 7 assesses a waterbody as having an acceptable level of total phosphorus.

DES RESPONSE **to 5- 14**

High chlorophyll-a and elevated turbidity do not necessarily co-occur in a given waterbody. Chlorophyll-a by itself can also interfere with recreational activities. Turbidity by itself can also interfere with recreational activities. To require a co-occurrence of the two factors for impairment determinations would be to ignore the independent impacts of each factor.

The chlorophyll-a thresholds used for assessment by the department were established based on laboratory filtered samples. Deviation of the sampling and analysis procedures from those used in threshold development to a method believed to produce different results would require a secondary threshold development for the second method of sampling and analysis. The department does not see the need for such an effort at this time.

DES RESPONSE **to 5- 15**

As previously noted in the response to comment 5- 10, human activities that lead to exceedances of water quality criteria are exceedences of water quality criteria and those waterbodies should be marked as impaired. CALM Primary Contact Recreation, "Indicator 2:

Discharges of Untreated Sewage" to protect human health exposure during swimming activities was crafted as a way to address bacteria measurements at the end of a pipe that discharges directly to surface waters. Basic manure spreading activities do not necessarily generate runoff with high bacteria count discharges.

DES RESPONSE **to 5- 16**

The water quality standards make no differentiation between riverine and lake-like impoundments. If fact, several sections of Env-WQ 1700 continue to group impoundments with lakes,

> *Env-Wq 1702.22 "Epilimnion" means the upper, well-circulated warm layer of a thermally stratified lake, pond, impoundment or reservoir.*

and this grouping exists whether or not there is thermal stratification, a common lake condition,

> *Env-Wq 1703.07 Dissolved Oxygen. (d) Unless naturally occurring or subject to (a), above, surface waters within the top 25 percent of depth of thermally unstratified lakes, ponds, impoundments and reservoirs or within the epilimnion shall contain a dissolved oxygen...*

With that said, the aquatic life use, chlorophyll-a indicator for lakes, ponds, and impoundments is only used in cases where a 'best trophic class' has been established by the Trophic Survey Program within the department. See note 3 in the Draft CALM, Section 3.2.4 Indicator 7a,

> "3. The ALUS chlorophyll-a thresholds shall only be applied to waterbodies where the trophic class has been determined."

Generally, the Trophic Survey Program has not conducted surveys on riverine impoundments. This is the case for the Garvins, Hooksett and Amoskeag dam impoundments. The 25 ug/L limit referenced by the commenter is not from the CALM.

Regarding the NPDES permit limits set by EPA, the CALM has no control over the actions of EPA permit writers.

DES RESPONSE **to 5- 17**

The first suggested addition by the commenter under Section 3.2.4, Indicator 1 Dissolved Oxygen appears misplaced. The intent of the existing text is to further illustrate that for a full support assessment, the majority of samples need to be collected in the critical season and at the critical time of day. For example, if three samples collected during the critical season and at the critical time of day indicated DO less than 5 mg/L, then the waterbody should be assessed as impaired due to low DO. If however, to those three samples, there were an additional 35 samples collected that were over 5 mg/L but those samples were collected in November and December, that is, outside the critical period, it would be inappropriate to use those samples to increase the number of samples needed to call the waterbody impaired for DO per the 10% rule (Section 3.1.17 Minimum Number of Samples - 10 Percent Rule). Similarly, if an additional 35 samples collected that were over 5 mg/L but those samples were collected in the mid-afternoon, that is, the non-critical time of day it would also be inappropriate to use those

samples to increase the number of samples needed to call the waterbody impaired for DO per the 10% rule (Section 3.1.17 Minimum Number of Samples - 10 Percent Rule).

The commenter next suggests that +/- ½ the meter error be applied as a sort of buffer around the water quality threshold such that only samples outside of the buffer be used to make support/non-support assessments. This is expressly the intent of the 10% rule and there no need to add another level of buffer to the assessment process.

> "The 10% rule is primarily intended to address situations where samples violate criterion but not by large amounts (i.e. values are within the accuracy of sampling and method of analysis)." (CALM Section 3.1.17 Minimum Number of Samples - 10 Percent Rule)

Further, an analysis of the 7,681 sample/replicate pairs of dissolved oxygen concentration collected since 2001 (valid samples in the Environmental Monitoring Database) revealed a median absolute difference of 0.09 mg/L, for a relative percent difference of 0.3%. Such low absolute and relative percent differences reinforce that the 10% rule is an appropriate cautious approach when suggesting a waterbody should be assessed as impaired.

The final change suggested in the comment is to lower the late afternoon (14:00-19:00), full support, DO (% saturation) value needed to consider the sample Fully Supporting verses Insufficient Information from 100% to 90%. The dissolved oxygen saturation criteria is to maintain DO at greater than 75% saturation on a 24 hour average basis. The translation of grab samples to project the 24 hour average is not a simple manner. Accordingly, the thresholds set in the CALM were intentionally established with a large range of values as Insufficient Information to minimize false fully-support and false non-support determinations. Those thresholds were established after analyzing the full range of datalogger deployments in the Environmental Monitoring Database (EMD) and then applying a safety factor to minimize false fully-support and false non-support determinations. In the absence of additional analysis to justify the suggested change, no change will be made.

DES RESPONSE **to 5- 18**

Subjective nature?

The commenter begins by referencing their Attachment 3 as an indication that the index of biotic integrity (IBI) is "*subjective*". As Attachment 3 is a copy of the Hopkinton-Everett Lake Agricultural lease program sign, the department is left to infer what the commenter is referencing. In the commenters Attachment 4 there is a demonstration of the relationship between IBI and the biological condition gradient (BCG) score and this attachment seems to be the intended reference given the section discussed by the commenter. The BCG score comes from a New England Wadeable Streams (NEWS) report from EPA which was written by Tetra Tech. In that report there is a section describing a 'fuzzy set' model which included biologists opinions to set initial BCG tiers to feed into the predictive model. The BCG tiers were included in the Inter-Department memo regarding probabilistic assessment of rivers (commenter attachment 4) as a demonstration of the relationship between IBI and BCG score, however this was not used in any waterbody final assessment, impairment or otherwise, nor was it used in

the probabilistic assessment. As such, there is no conflict with the commenter conclusion that, "*This quote reinforces the statement regarding the disadvantages of this model."*

Probabilistic verses Census Assessments

Also see the response to comment 5- 1

The Inter-Department memo regarding probabilistic assessment of rivers (commenter Attachment 4) by D. Neils and P. Trowbridge outlines the results from a probability-based assessment of wadeable streams conducted in 2002 and 2003. The results from this study were used ONLY to report on the overall condition of wadeable streams across the state, NOT for purpose of assessing macroinvertebrate sample IBI scores for waterbody level final assessment.

The department memo indicates that an alternative macroinvertebrate IBI (i.e. the Wadeable Streams Assessment IBI or "WSA-IBI") was used for evaluating the data which was gathered because the study was a multi-state effort requiring the use of a standardized set of methods that differed from standard department protocols. For this reason, an independent contractor constructed a "method-specific" evaluation tool, the WSA-IBI, that could be used across the region. The major methodological differences included the use of kick-nets for collection (rather than artificial substrates) across a range of habitats (rather than a single habitat type). Therefore, while the commenter correctly identifies a difference in evaluation thresholds, these were warranted based on the difference in methods. Further, the results were applied solely to a state-wide condition assessment, NOT for purpose of assessing macroinvertebrate sample IBI scores for waterbody level final assessment.

The graph and plots the commenter refers to with respect to margins of error are meant solely for expressing the predicted range of overall condition for the state-wide assessment and NOT with respect to an assessment outcome for an individual waterbody.

Applicable IBI Indicator thresholds

The commenter references Attachment 8 (NH Benthic Index of Biological Integrity (B-IBI) for Wadeable Streams, 2006 Threshold Modifications to Account for Natural Variation) to comment on the method used in 2006 to adjust the B-IBI. The use of the standard deviation method of threshold adjustment (a 12-point adjustment) used in 2006 is no longer used. While the current method used to adjust the B-IBI sounds similar to the 2006 text, the two methods are fundamentally different. Therefore, that portion of the comment has not been addressed. The change from an eight to a seven metric index created a more representative index by dropping the least discriminatory metric. The B-IBI threshold used for assessments, as Described in the CALM since the 2010 assessment, is 90% of the B-IBI score identified as the 25th percentile of the range of scores for undisturbed sites. In all cases with respect to B-IBI thresholds, the numeric value applied for assessment purposes ensures that an impairment listing is warranted if the threshold is not met. Further, each assessment outcome is reviewed for data quality, applicability, and quantity prior to an impairment listing.

The commenter takes issue with the use of the Caton (1991) method of sub-sampling macroinvertebrates. The original IBI developed by K. Blocksom in 2004 identified methodological differences with respect to macroinvertebrate sorting techniques. However, in the 2011 document by B. Jessup and D. Neils, eliminated this bias through the use of data produced using ONLY the Caton method. The report was based on data from 74 undisturbed sites and utilized the original metrics identified by K. Blocksom, but revised the classification system and B-IBI thresholds used to assess the condition of benthic macroinvertebrate communities. The thresholds were based on the 25th percentile of the range of observed B-IBI scores at undisturbed sites. As the commenter correctly notes, threshold B-IBI scores are different with respect to specific stream "classes" (or types). Stream classes identified in this report and their respective IBI thresholds account for natural differences in the most important stream characteristics that structure macroinvertebrate communities.

It should be pointed out that IBI score thresholds are based, in part, on results from undisturbed streams and these results vary among undisturbed streams. For this reason, the department IBI score thresholds are based on 90% of the 25th percentile of the full range of scores across undisturbed streams to account for natural sources of variability. In this manner, IBI thresholds are set at the lower range of the IBI scores than occurs at undisturbed sites. The suggested changes to the table 3-24 (Described as table 3-4 by commenter) indicator thresholds would only weaken this indicator which already is quite cautious when it comes to assessing a waterbody as impaired. The department does not use a partial support assessment. By definition, a parameter in partial support is also partially not supporting. If the commenter meant to imply that there should be an intermediate assessment between full-support and non-support, that is what the department calls insufficient information. The category is further refined as potentially attaining and potentially non-support, depending upon which direction the data suggests. In the case of the B-IBI, the threshold for full support is already set quite low. However, in cases where the applicability of the IBI is in question, the assessors use the insufficient information assessment categories. Formal recognition of this practice has been added to the CALM.

Other comments

The commenter references their Attachment 5 (2011 AECOM TMDL Model). This model is not related to the benthic-IBI and other elements of this comment are addressed in the responses to comments 5- 5 and 5- 11.

Attachment 7 from the commenter documents their estimated stormwater cost which are not within the purview of the CALM.

DES RESPONSE **to 5- 19**

The quantitative measures used to determine final metric inclusion into the Cold Water Fish Assemblage (CWFA)-IBI were strict and are spelled out on pg. 10 of the report entitled "Coldwater fish assemblage index of biotic integrity for New Hampshire wadeable streams" (75% of "test" sites met criteria) (NHDES, 2007). The commenter correctly points out that the

Eastern Brook Trout (EBT)-age-class metric (a discrete variable) performed poorly with respect to this measure. This was in part inherent to the inclusion of a discrete variable in an overall metric that is populated with several continuous variables. However, it does not negate the importance of having multiple age classes of brook trout, including documentation of recent successful reproduction (young-of-year presence), in a healthy coldwater stream. The inclusion of this metric was a "common sense" decision backed up by its successful use by the VT DEC, a state with streams similar to NH and with reference to scientific publication (Halliwell et al. 1999) of brook trout as an important indicator species. Finally, documentation of successful "propagation" of fish is expressly listed as national goal of the Clean Water Act [Section 101(a)(2)].

The commenter referenced notes from a presentation at the 'Alaska Forum on the Environment' (commenter attachment 10) was focused on the pathways for mercury through the food chain in order to determine the level of human health concern. The presentation illustrates that mercury comes from multiple sources. The levels seen in the Alaska study were 0.05 to 1.50 ug/g (ww) in slimy sculpin and 0.05 to 0.70 ug/g (ww) in macroinvertebrates. The highest body concentrations were seen below the Red Devil mine site, a former mercury mine, a location of clear human disturbance. In New Hampshire, mercury also comes from multiple sources including atmospheric deposits that cannot be deemed ‘natural’. Fish tissue in New Hampshire ranges from approximately 0.27 to 0.57 mg/kg (mg/kg = ug/g) which is why a state-wide fish consumption advisory exists (NHDES, 2008).

The principle threat from mercury is to human health. As such, the water concentration of mercury to protect human health for fish consumption is much lower, at 0.051 ug/L, than is the concentration to protect aquatic life at 0.77 ug/L. The Human Health threshold is much lower to address the bioaccumulative properties of mercury in fish tissue. Data from the departments Environmental Monitoring Database (EMD) from 2000-2013 includes 173 records of mercury analyses in surface water. Of these 129 were below the detection limit. The remaining 44 records had a median of 0.0016 ug/L and all only one exceeded the human health for fish consumption threshold of 0.051 ug/L at 0.060 µg/L. From this we see that nearly all samples have been well below the chronic threshold for mercury to protect aquatic life health (0.77µg/L). Thus, from the available data it is concluded that the impact of mercury on the survival and reproduction of fish is not measurable.

The naturally low fish species diversity in coldwater streams of northern New England is, in part, the combined result of the environmental conditions (e.g. cold water temperatures, low nutrients, variable flows). These conditions can be made worse by human impacts.

The commenter identifies the potential for stocked salmonids to influence the composition of the native fish community through predation. The department is aware of the New Hampshire Fish and Game stocking locations and factored such locations into the development of the CWFA-IBI by choosing non-stock sites or removing stocked fish from the dataset for the reference sites. Further, when evaluating individual sites, the onsite biologists make notes in the field datasheets distinguishing stocked from wild fish such that the stocked fish are not used in the tabulation of the site level scores for the CWFA-IBI.

IBI thresholds, as noted above, are assigned based on the distribution of IBI scores at undisturbed sites. The department has selected the 25th percentile of the distribution of IBI scores for undisturbed sites to represent the point at which there is a significant departure from the natural integrity of the biological community as defined in Env-Wq 1703.19. The selection of this percentile as the threshold is used as an interpretation of the narrative water quality criteria, and by definition, could result in up to 25% of undisturbed sites with IBI scores below the threshold. However, the IBI results obtained from individual sites are evaluated in conjunction with all available information, including recent flood history, to arrive at a final assessment decision. The listing decisions are further reviewed by department staff before decisions become final. In some cases, as suggested by the commenter, additional, follow up information is necessary before an assessment outcome is determined.

The commenter concludes by suggesting adjustments to the thresholds for the CWFA-IBI and the Transitional Water Fish Assemblage (TWFA)-IBI such that there is a middle ground for a '*partial support*' category. Partial support cutoffs, as suggested by the commenter, are not provided in the IBIs with respect to assessment outcomes. The thresholds that are identified are already representative of the natural range of variation in IBI scores for 75% of the undisturbed sample locations. As noted above, an additional margin of safety was incorporated into each IBI as 90% of the threshold IBI score. The further lowering of the IBI impairment listing thresholds for the purpose of incorporating a partially supporting category would not provide adequate protection for the aquatic communities they are Designed to protect.

DES RESPONSE **to 5- 20**

The commenter provides some calculations suggesting a large potential variability in scores used in CALM Section 3.2.4., Indictor 6, Habitat Assessments. However, to consider a site impaired for habitat requires that either the site must be impaired based one or more if the Indexes of Biological Integrity (IBIs) plus have one of the habitat metrics fall below 11 or multiple habitat metrics must fall below 11. It is not the case that metric parts are averaged together. In practice there have been only 18 sites deemed impaired due to habitat degradation out of the 152 sites with macroinvertebrate and/or fish population data and all 18 sites also failed the Macroinvertebrate Biological Integrity (IBIs).

DES RESPONSE **to 5- 21**

As noted in the response to comment 5- 16, Indicator 7 covers the chlorophyll-a indicator for only lakes, ponds, and impoundments and is only used in cases where a 'best trophic class' has been established by the Trophic Survey Program within the department. See note 3 in the Draft CALM, Section 3.2.4 Indicator 7a,

> "3. The ALUS chlorophyll-a thresholds shall only be applied to waterbodies where the trophic class has been determined."

The commenter states that, "...*increasingly, the lake criteria is being ascribed to all waterbodies*." That is not the case in the 305(b)/303(d) assessments. Thus the commenter may

be referring to actions by EPA permit writers via its NPDES permit limits over whom the CALM has no control.

DES RESPONSE **to 5- 22**

Sites within the normal range of the established 'Hydraulic Geometry Curves' are by definition in a state of dynamic equilibrium. A river system in dynamic equilibrium may have visual changes in position, woody debris, and bed material but will still be within the normal range of the established 'Hydraulic Geometry Curves'. An example is the Pemigewasset River in Woodstock. Channel instability triggered by gravel extractions in the 1970s was restored in the summer of 2009 via natural channel Design methods. After experiencing the flood of record at 50,000 cfs on August 28, 2011 (TS Irene), the site was resurveyed at monumented cross sections and remained within the normal range of the 'Hydraulic Geometry Curves' (http://water.epa.gov/polwaste/nps/success319/nh_pem.cfm). The department does not have empirical evidence that the 2005 Hydraulic Geometry curves need revision.

DES RESPONSE **to 5- 23**

The routes for the contamination of phosphorus samples when floating around in the middle of a lake or pond are few when compared with potential metals contaminations routes when sampling from a river bank or bridge crossing over a river. In considering this question, the department discussed the issue with EPA limnologists and they concurred saying that when they have run field blanks, those blanks always come back as non-detects.

Similar to comment 5- 14 and the response regarding chlorophyll-a methods, the total phosphorus indicator thresholds in the CALM were established based on conventional field sample methods. Therefore any perceived contamination is already built into the indicator thresholds. Additionally, full-support and non-support assessments are based on a median of five or more samples; therefore the influence from any one sample is minimized.

Finally, total phosphorus is used in a stressor-response matrix. As noted in the response to comment 5- 13, the chlorophyll-a indicator in lakes dictates whether nutrient levels are high enough to cause an impairment. This is the underlying premise for the Aquatic Life Indicator 7: Chlorophyll-a (Chl-a) & Total Phosphorus (TP) in Lakes. In the absence of high chlorophyll-a measurements, Indicator 7 assesses a waterbody as having an acceptable level of total phosphorus.

The department encourages all samplers to be vigilant in their efforts to eliminate possible contamination routes but does not see the need to apply a nutrient adjustment allowance at this time.

DES RESPONSE **to 5- 24**

The department recognizes the apparent discrepancy between the data age constrains for chemical and biological data and the longer age constrains for the flow assessment. This difference stems from the fact that the Indicator 19 (commenter referenced as Indicator 10) Flow assessments are not used to make full-support and non-support determinations. As noted in the introduction to this indicator;

> The General Standard is a quantitative method for assessing aggregate water use at any river location relative to stream flow at that location. For the purposes of assessment, the methodologies below **will be used to identify which surface water may, or may not have, adequate flow**. [emphasis added]

COMMENT # 6: Merrimack - Richard S. Seymour, Jr. - Public Works Department – Director

***DES RESPONSE to* 6- 1**

Waterbodies that do not meet water quality standards because of some pollutant are by default included on the 303(d) List. We can look at this question from the stand point of, "how does a waterbody avoid getting on the 303(d) List or get off of the 303(d) List?" The first route off of the list is through the completion of a Total Maximum Daily Load (TMDL) in which the waterbody/pollutant combination if moved off of the 303(d) list but is still impaired. The second route off of the list is through an enforceable document in place that requires actions to meet water quality standards. A Typical example is an Administrative Order from EPA for a municipality to remove Combined Sewer Overflows (CSO). Such Administrative Orders contain a timeline for actions to restore water quality. In the assessment process, the 'reasonable time frame' statement suggests that some other enforceable measure will result in the waterbody meeting water quality standards and that other measure is time bound. In practice, that 'reasonable time frame' is dictated by the Administrative Order, enforceable permit, or other measure that is agreed upon outside of the assessment process. The third way off the list is to meet water quality standards.

***DES RESPONSE to* 6- 2**

There are five main headings, one of which, Category 4 has three parts; 4A covers impairments with a completed TMDL, 4B covers impairments where some other enforceable action will restore water qualities, and 4C covers impairments, like invasive exotic plants, for which a load cannot be assigned. With Categories, 1, 2, 3, and 5 we have seven categories. The text in the CALM has been revised to make the five main categories more clear.

***DES RESPONSE to* 6- 3**

See the response to **1- 10**

***DES RESPONSE to* 6- 4**

Water quality changes with season, flow, wind, rain, snow, waste load, implemented restoration activities, and many other variables while sampling of the water quality a snapshot of the system conditions. The data age considered acceptable for assessments recognizes that samples are a snapshot in time and the most recent picture may not reflect the more limiting conditions for a particular parameter. The CALM spells out several factors used to balance out the need for a "current" assessment with the assessment of the health of the waterbody, including;

- the NHDESire to have the most current data possible;
- incorporating datasets from water quality limiting time periods;
- the amount of data needed to make an assessment; and,
- the resources and time needed to collect the data.

Because the turnover rate of lake water can be on the order of years, the 10 year data age is warranted. Further, it is quite rare that the department suddenly receives ten years of water quality data on a waterbody for which we have no previous data. In the assessment process, the department looks back to the longer dataset to see if the data indicates impairment. If so, additional work is done to compare the condition under which the impairment data were collected. If the newer data demonstrate that conditions have improved then the waterbody may be delisted. While the CALM specifies 10 years of data for lakes, in practice, the focus is on the most recent data. All of CALM specifications are subject to the final input of the assessor who may know that a waterbody has received one or more actions aimed at restoring water quality. With documentation of those restoration efforts, the assessor can further weigh the more recent data and discount older data.

***DES RESPONSE to* 6- 5** (also see response to 3- 8)

There are two key pieces of information when thinking about samples that are measured below detection limits (BDL). The first is that there are very few places in the assessment methodology that values, particularly those that could be BDL, are averaged. For example, in tidal waters, the dissolved oxygen saturation is averaged between low and high tides, but dissolved oxygen saturation not a parameter that can be BDL when using normal field meters. Similarly, if detailed chlorophyll-a profiles are collected, the average of the top four meters is used to compare to the swimming indicator, but chlorophyll-a is not a parameter that can be BDL when using standard spectrophotometer methods. Where sufficient toxics data exist to calculate a 4-day average (chronic) or 1-hour average (acute), values may be averaged, but this typically only exists for chloride data and the detection limit is several orders of magnitude below the chloride criteria. For calculation of the geometric mean (average) to compare to the enterococcus and *Escherichia coli* criteria, a zero value cannot be used due to the mathematical equations. As such, '1' is factored in the place of zeros. See the response to comment 3- 8.

It should also be noted that, for individual samples the CALM states when values are below detection limits (BDL) and ½ the detection limit is greater than the water quality criteria, that sample will not be used to make non-support assessments (Section 3.1.12).

***DES RESPONSE to* 6- 6**

Most of the issues raised by the commenter have been addressed in response to comments 3-10 and 5- 9. The remaining issue raised by the commenter regarding sample quality is addressed in Section 3.1.10 of the CALM. Comments on data quality have been addressed in response to comments 1- 10, 5- 6, and 6- 3.

B. PUBLIC COMMENT ON THE DRAFT 2012 SECTION 303 (D) LIST

COMMENT # 1: Amherst - Bruce W. Berry - Director of Public Works

DEPARTMENT OF PUBLIC WORKS
22 Dodge Road
Amherst, NH 03031
Tel. (603) 673-2317 Fax (603) 249-8857

bberry@amherstnh.gov

October 10, 2013

Water Quality Data
New Hampshire Department of Environmental Services
Watershed Management Bureau
Attn: Mr. Ken Edwardson
P.O. Box 95
Concord, New Hampshire 03302-0095

1- 1

Reference: 2012 Section 305(b) and 303 (d)

Dear Mr. Edwardson,

First and foremost, I want to thank you for hosting the information meeting Monday afternoon September 9, 2013 to explain and take information on the Comprehensive Assessment and Listing Methodology (CALM). The Town of Amherst's interest is vested in its appearance on the 303 (d) listing.

The town acknowledges it had and did not take advantage of its opportunity to comment and correct the multiple errors found in document # 09090-107-15. The focus now needs to be, how testing and reporting errors can be corrected.

I offer the following thoughts and comments regarding the 2012 Section 305(b) and 303 (d) Consolidated Assessment and Listing Methodology document.

Page 1, (Chapter 1) Section 1.1 Purpose, paragraph 3 in part states,

The primary purpose of this document is to describe the process used to make surface water quality attainment decisions for 305 (b) reporting and 303 (d) Listing purpose.

1- 2

Is the Comprehensive Assessment and Listing Methodology (CALN) a Testing Guidance or a Water Quality Standard?

Page 3, (Chapter 1) Section 1.2.3 Assessment Database (ADB)

For the 2002 cycle, New Hampshire was one of the first states in the nation to use the new ADB. Approximately every two years EPA releases a new version of the ADB. For 2012, DES is using ADB V2.14 which is the same

1- 3

version used since the 2004 assessment. DES has not had the time or staff to revise all the queries. DES hopes to eventually upgrade to a more recent version of ADB in the future.

DES should be applauded for being one of the first states to convert to this system, however by your own print, you acknowledge there have been four version upgrades but because of staffing, the upgrades have not been made.

Because of staffing deficiencies, the Town of Amherst did not review the above mentioned Baboosic Lake report and therefore did not bring to DES's attention that forty-four (44) homes, many along the lakefront are, on a community septic starting in 2004 (Phase 1) and a 2007 grant application included the following;

The Baboosic Lake Community Wastewater System project is located in the town of Amherst in the Baboosic Lake watershed. The sources of water quality impairment targeted by this project are failed septic systems, problem systems, or systems in close proximity to both surface water and ground water. Phase 1 of the project, which serves twelve dwellings and provided a community equalization tank and two community leach fields was completed in 2004. Phase 2 construction is substantially complete and serves ten dwellings and provides future capacity for three additional lakefront dwellings. Phase 2 also added a pretreatment and denitrification system that serves both Phase 1 and Phase 2 users and doses pretreated effluent to the leach fields constructed under Phase 1.

Phase 3, the subject of this grant application, will provide a new collection system to serve the Clark Avenue area and an additional community pretreatment tank, which will increase the capacity of the overall system. The proposed area to be served by Phase 3 includes the thirteen homes with septic systems that are closest to the water's edge and sit at an elevation very close to lake level in an area where the groundwater table is most influenced by the lake water level. This lakefront area has experienced high water levels twice over the last three years. The project will provide a watertight collection system that will move the effluent away from this lakefront area, which will decrease phosphorus, nitrate, nitrogen, E. coli, and effluent nutrient discharges into Baboosic Lake.

BABOOSIC LAKE PHASE 3 PHOSPHORUS CALCULATIONS
Assumptions:
- *Phosphorus concentration in household wastewater = 10 mg/L*
- *Average house occupancy = 2.3 people/house*
- *Wastewater produced per capita = 75 gpd/person*

Phosphorus Discharged into Baboosic Lake by Phase 3 Properties:
PO4 = 10 mg/L x 2.3 people/house x 75 gal/day/person x 3.7843 L/gal = 6.5 grams/house/day
PO4 = 6.5 grams/house/day x 365 days/yr = 2.3 kg/yr
PO4 = 2.3 kg/yr x 13 Phase 3 Properties = 30 kg/yr
Phosphorus Removal:
Precipitation = 50 kg/yr
Direct Land Use/Stormwater Runoff = 63 kg/yr
Shoreline Septic Systems = ±100 systems x 2.3 kg/yr = 230 kg/yr
Total Phosphorus Contributions from Watershed = 343 kg/yr
2.3 kg / 343 kg = 0.7% Removal per System Removed
30 kg / 343 kg = 8.7% Removal for Phase 3
Phosphorus Removal Total Project Summary:
Phase # of Properties Phosphorus Removed % of Total Watershed
Phase 1 1 2.3 kg 0.7%
Phase 2 4 9.2 kg 2.7%
Phase 3 13 30 kg 8.7%
Total 18 41.5 kg 12.1%
Phase 3 will provide 72% (30 kg/41.5 kg) of the total phosphorus removal for all three phases.

1- 4

Department of Environmental Services has an obligation to have the best possible database available, as I do not believe my staffing levels or lack thereof will be taken into account in meeting the TMDL requirements.

Page 4, (Chapter 1) Section 1.2.5 Probabilistic Assessment (last sentence)

For more information about probabilistic assessments, see Section 3.1.27.

My download did not include the referenced section. As this information was not avialble we request further time to review and comment once that information becomes available. **1- 5**

Page 4, (Chapter 3) Section 3.1.1 last paragraph

Since the creation of the Assessment Units (AU) for the 2002 assessment some discrepancies have arisen between the AU IDs and HUC-12 Boundaries due to NRCS recoding of some HUC-12 regions.

Table 3-2 (Factors used to establish Homogenous and Manageable AU's). Factor section 2 and 3 define the HUC-12 boundaries and how the AU's should all have the same water quality standards. **1- 6**

Question: Where can I find in this document if Amherst falls within the discrepancies between HUC-12 and AU's as identified and defined in your report?
As this information was not available we request further time to review and comment once that information becomes available.

Page 5, (Chapter 3) Section 3.1.2 Designated Usages

Please understand that while we will be tasked in implementing the final outcome, some of us are laypersons and not experts in this field. **1- 7**

Question: Who decides on further review and interpretation of regulation ENV-Wq 1700 regarding its expansion and refining to include the seven specific designated uses shown in Table 3-4?

Page 8, (Chapter 3) Section 3.1.5 DES Supplemental ADB and Sub-Categories of Support for Parameters, Uses and Assessment Units.

The EPA built Assessment Database (ADB) currently only tracks parameters causing impairments and does not give indication of the degree that a parameter, use, or assessment unit meets water quality standards, or is impaired. Comments received from the public on the 2004 report indicate that assignment of sub-categories to Uses and AUs which indicated the degree of use support (i.e., just how good or bad is the condition of the surface water) would be beneficial. **1- 8**

As referenced earlier in this letter, starting in 2004, the Town of Amherst in four approved phases added 44 homes to a community septic and benefiting in three of the four phases from DES approved Watershed and State Aid Grants (Phase IV used an SRF loan). Since all this took place after the "2004" report, does the DES database share critical data amongst sub-sections of its organization?

And if the answer is yes, would that trigger additional testing?

Page 12, (Chapter 3) Section 3.1.8 "Naturally Occurring" Water Quality Exceedances

Although there are other exceedances that are suspected to be of natural origin (such as bacteria exceedances due to wild life), the source was listed as unknown for this cycle since a process has not yet been clearly defined for determining when the source can be considered natural. **1- 9**

Question: Based on the above, "since DES has not clearly defined" and lacks the staff to do so, the burden of proof falls on the individual community? What would the process/procedure be to demonstrate proof?

Page 14 & 15, (Chapter 3) Section 3.1.10 Data Quality

Criteria for determining the appropriate level are provided in Table 3-8. As shown, only data which is considered to be Fair, Good, or Excellent can be used to make a final assessment.

Use of volunteer Data: In New Hampshire there are two very active volunteer monitoring programs coordinated by DES: the Volunteer Lake Assessment Program (VLAP) and the Volunteer river Assessment Program (VRAP).

1- 10

The town of Amherst does not dispute level of expertise of DES staff. However, it has extreme concern regarding the financial implications to this or any town where volunteer "Samplers had some training". It has concerns regarding the accuracy of testing procedures and the custody of such sampling. The results of testing have significant long-term consequences (monetary and otherwise) on municipalities and as such, there should be certification that samples are taken using industry approved sampling standards.

DES's online Guidance for Submittal of Surface Water Data/Information

"Encourages anyone who has surface water data/information to submit it to DES electronically at any time"

What are the parameters of data/information DES is interested in? Are data/information submissions required to include information detailing sampling procedures?

How data/information is used in the assessment depends largely on the quality and completeness of the submission. In general, scientifically sound and defensible evidence is needed to determine if a waterbody is meeting water quality standards or is impaired. Evidence that does not meet these criteria however is still useful as it provides a preliminary sense of water quality that can be used to guide future monitoring efforts/investigations designed to fill data gaps needed to make a final assessment.

1- 11

Who is held accountable for the QA/QC? Why is the burden of proof and associated financial burden shifted down to a municipality? It there an understanding how dangerous that last sentence is?

Page 15 & 16 (Chapter 3) Section 3.1.11 Data Age

In such cases, the data used to make the original assessment, regardless of its age, was included in the reassessment provided it met all other data requirements (including the minimum number of samples) stipulated elsewhere in this assessment methodology. This was done to prevent removal of waters from a threatened or impaired category based solely on data age.

Consequently use of 10 year old data for lakes and ponds, though not ideal, is believed to provide a reasonably accurate assessment of water quality conditions in most cases.

1- 12

In the case of Baboosic Lake, ten years ago, the community septic did not exist. From your own document you acknowledge "though not ideal", DES apparently has taken the position(regardless of cost) that the science of averaging pre (even longer than ten years) and post data is ok.

Does the Town of Amherst understand that position correctly? What is the procedure for submitting an appeal for cases like Amherst where previous data is no longer valid due to significant structural improvements have been made and old data is no longer valid?

Did the Town of Amherst correctly understand that DES used ten year old single source sample data to place Baboosic Lake on the 303 (d) listing? Do we correctly understand that recent data information was added but averaged? If this is true the Town of Amherst would like the opportunity to file an appeal.

In closing, make no mistake, the Town of Amherst is committed to clean water and supports the Clean Water Act, but impairments must be based on solid data.

Sincerely,

Bruce W. Berry

Bruce W. Berry
Amherst Director of Public Works

1- 13

COMMENT #2: Danville - Bruce Caillouette, Road Agent

Town of Danville

Highway Dept.

Bruce Caillouette, Road Agent
210 Main Street
Danville, NH 03819
Tel. 603-382-0703

Selectmen
Shawn O'Neil
Chris Giordano
Annemarie Inman
Michelle Cooper
Joshua Horns

Town Clerk
Christine Tracy
Tax Collector
Kimberly T. Burnham

October 11, 2013

Water Quality Data
New Hampshire Dept. of Environmental Services
Watershed Management Bureau **VIA EMAIL**
PO Box 95
Concord, NH 03302-0095

To Whom It May Concern:

In response to the Comprehensive Assessment and Listing Methodology (CALM) Report review we have the following comments to this report.

- The test results used in the report to designate "impaired" waters is not always current testing they are from an approximate time from five to ten years old and do not even have information collection data. **2- 1**

- Determinations of the water quality data need to be based on current data and tests not data that is older than one to three years. **2- 2**

- The test areas need to be reviewed and verified to see if there are natural conditions that are contributing to the water quality instead of just presuming that there are other causes. **2- 3**

- All these test results are used to report to the EPA and the regulatory requirements by both the State and Federal Agencies can be misdirected. Resulting in the misdirection of protecting the environment properly. **2- 4**

We appreciate your review of the document to make the document a more accurate and consistent document. To obtain the correct data requirements needed to get the correct field data and impairment listings accurately. So that towns can use this information to address their issues that are true impairments not caused by nature and environment.

Thank you.

2- 5

Very truly yours,

Bruce Caillouette, Road Agent

BC/blc

COMMENT # 3: Goffstown - Carl Quiram, PE, PWLF, Env-SP Public Works Director

Town of Goffstown

DEPARTMENT OF PUBLIC WORKS

October 11, 2013

Water Quality Data
NHDES – Watershed Management Bureau
P.O. Box 95
Concord, NH 03302-0095

3- 1

RE: Comments to 2014 CALM

Dear Mr. Edwardson:

The Town of Goffstown appreciates the opportunity to comment on the CALM. As we have all noted over the past few months this document has a profound impact on the costs associated with a municipality dealing with their aging infrastructure. Clean water is essential for all of us but resources are limited so it is incumbent on all of us to work together to make the most efficient use of those limited resources. On behalf of the Town of Goffstown I would like to offer the following comments:

3.1
For practical purposes, the designation of an AU that spans municipal boundaries will be difficult to manage when trying to assess compliance costs and responsibilities or impairments prior to the development of a TMDL.

3- 2

3.1.2
I would suggest that we review our current uses and waterbody data before overlaying another new factor for wildlife.

3- 3

3.1.4
The definition used for what is considered threatened water appears to be presumptuous. The first parameter that water is "expected to exceed" water quality standards. What is this expectation based on? Is it that the data shows there have been no improvements in the past few years? And if there is no sampling planned or done in the future how is water going to be threatened if there is no evidence otherwise. The second parameter of not having in-stream violations but other data indicate potential seems far reaching. Data should be confirmed with adequate in stream sampling before being listed. The main point I believe is this definition of threatened needs more detail. I believe it leaves a lot to be assumed which could put many waters in categories they do not belong.

3- 4

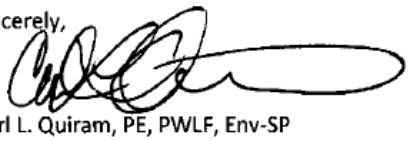
3.1.5 Table 3-6
In the definitions of the DES Sub-Categories there are references to one or two exceedances of standards are needed. That few examples of exceedance seem inadequate to place a water body on an impairment list.

3- 5

3.1.8 This is an important section of the CALM. For future assessments for many waters need to be looked at whether the problem is naturally occurring or not. Many pollutants that cause impairment are outside of human control, i.e. wildlife. Even proving that water is impaired by natural occurring elements can be difficult at times. If there was a way to expand this section to allow more information about naturally occurring elements to factor into water impairments that would be most helpful for all cities and towns. Any data taken in close proximity both physically or in time to a major flooding event should be removed from the database (ie. Harry Brook samples within a month of the 2006 Mothers Day flood) Water bodies should not be listed as impaired based on assumptions. They should not be listed until the impairment is confirmed with hard in-stream data.	**3- 6**
3.1.11 Data age can affect whether a water is listed as impaired or not. Assessments on impaired water bodies need to be made regularly. The statement about waters previously listed as impaired should be removed from the CALM especially if the data that made the original assessment is outdated. For example a lake could have been listed in 2006 based on sample taken in 1996 but no other samples have been done since. So now in 2013 the water is still listed but the data set is now 17 years old. A lot could happen within lakes and/or ponds which could change the water quality. A data range of 10 years for lakes and ponds does not seem ideal. I suggest that once a data set reaches beyond 10 years that the water be moved to a different category. This could help identify what waters need better assessment or more updated data. This could even better align a sampling program for those waters that need further assessment.	**3- 7**
3.1.12 The correct sample analysis protocols need to be spelled out and clearly differentiated. Samples below detection limits should be considered clean.	**3- 8**
3.1.14 Samples taken less than 500 feet away from each other can have dramatically different values even if they were both sampled at the same time using the same protocols. Instead of taking the worst case value for that day all data should be included or at least all data should be aggregated.	**3- 9**
3.1.17 The 10% rule is a great effort to try and determine how many samples it must take to violate water quality. It is still troubling that only two (2) samples could list a water as impaired. Further detail needs to go into how samples must it take to impair a water body.	**3- 10**
3.1.20 A predictive model can be an important tool to better assess water quality of a stream. The trouble comes when a water body is listed as impaired based on a predictive model. This shows that no in-stream samples were actually taken and it is assumed the water would be impaired. Would it beneficial to list the water bodies under another category for further assessment or more data needed? This could eliminate many waters being placed on the impaired list when no actual data has been collected.	**3- 11**
3.1.22 If an impairment has an unknown source it should be placed in Category 5 for a TMDL. By putting it in this category it automatically places it on the 303(d) list. Once on the list it is very difficult to get a water body removed. If the impairment is from an unknown source, then it could be placed in Category 4C or even 2. This would prevent it from being completely eliminated but rather indicate that further assessment is needed.	**3- 12**

I am not in a position to consider myself a water quality expert so I will not offer any comments on the scientific basis laid out in the CALM, however, I would reiterate that all of us who are involved in this process need to be very cautious about using sound data and sound science to make these very important decisions. Thank you again for the opportunity to comment.

Sincerely,



Carl L. Quiram, PE, PWLF, Env-SP
Director

cc: Board of Selectmen

3- 13

COMMENT #4: Great Bay Municipal Coalition (no formal signature or identification of participating communities)

Received from:
Keisha M. Sedlacek, Esq.
Hall & Associates
1620 I Street, NW
Suite 701
Washington, DC 20006
Ph.: 202.463.1166
Fax: 202.463.4207
E-Mail: ksedlacek@hall-associates.com

Great Bay Municipal Coalition
Comments on the New Hampshire 2012 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology

The Great Bay Municipal Coalition ("the Coalition") provides these comments on the New Hampshire Department of Environmental Services ("DES") document entitled "2012 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology" ("2012 CALM") which DES intends to use for its 2014 surface water quality assessment. **4- 1**

The Nature of CALM Impairment Designations

The 2012 CALM is a critical document relied upon by DES in making surface water quality attainment decisions for § 305(b) reporting and § 303(d) impairment listings under the Clean Water Act. As DES is aware, EPA relies heavily upon these impairment designations to trigger more restrictive wastewater, stormwater and non-point source control measures. Where impairment listings are established, EPA presumes that point sources are significant contributors to the problem, even where such data is lacking and the listing is based upon very limited field data. Where impairment listings are based on limited or dated information, such presumptions will lead to widespread misdirection of local resources and will not ensure that public health and the environment are reasonably and properly protected. Therefore, the 2012 CALM should be amended in the following ways, to ensure that the 2014 impairment listings are properly designated. **4- 2**

1. **The 2012 CALM should be amended to clarify that unless a specific pollutant and the point source of that pollutant is identified, an impairment listing should create no presumption that a condition was caused by point sources.**

Most CALM impairment decisions are preliminary determinations made, in general, based on limited information and little or no analysis of the factors/mechanisms causing the measured condition to exist. In many cases data relied upon is outdated and does not necessarily reflect the current conditions of the waterbody. Therefore, unless and until impairment decisions are fully assessed, point sources should not be presumed to be the cause of the impairment. **4- 3**

2. **The 2012 CALM should also be amended to specify that field confirmation regarding the nature and cause of the condition is necessary and should be verified before any decision to impose regulatory requirements is made to ensure that state resources are properly directed.**

Even where preliminary impairment determinations are made, it is possible that natural conditions may be the actual cause (which under state law does not constitute a violation of narrative standards). *See, e.g.,* Env-Wq 1703.14 (for nutrients, an impairment does not exist if the condition is "naturally occurring"). For example, geese may be the cause of elevated bacteria readings in a water body and rock weathering may be the cause of aluminum criteria exceedences. Likewise, as documented in the Great Bay system, color dissolved organic matter ("CDOM") may control the occurrence and persistence of low transparency that otherwise limits ecosystem resources (e.g., eelgrass population). In either case, point source regulation would not materially alter the condition and any presumption that it would, is not defensible. Where DES has specific information showing that point sources or other man-induced conditions are the cause of the "impairment", DES should specifically cite to and provide the public an opportunity to comment on the accuracy of such determinations given the regulatory requirements triggered by such determinations.

4- 4

Narrative Criteria Impairment Listings

3. **The CALM should not rely on presumptions that certain pollutants are the cause of use impairments (e.g., nitrogen and eelgrass in Great Bay) without a full narrative criteria demonstration.**

Narrative criteria implementation may provide a reasonable way to ensure that aquatic life protections occur in the absence of specific numeric criteria. However, the existing state narrative criteria require a multi-step demonstration to confirm the existence of a "violation." The existence of a degraded ecological condition must be verified *and* it needs to be reasonably confirmed that a man-induced pollutant was the cause of the condition (e.g., a full narrative criteria demonstration is necessary to determine that pollutants are *causing impairments* such as confirming that nitrogen is causing eelgrass loss). On September 12, 2013, EPA released a document entitled "Guiding Principles on an Optional Approach for Developing and Implementing a Numeric Nutrient Criterion that Integrates Causal and Response Parameters" ("Guiding Principles") which confirms scientifically defensible criteria must be based on a cause-and-effect demonstration (not mere assumptions). Attachment 1. The purpose of the document "is to offer clarity to states about an optional approach for developing a numeric nutrient criterion that integrates causal (nitrogen and phosphorus) and response parameters into one water quality standard (WQS)." *Id.* at 1. A "response parameter" is an ecosystem response such as algal growth, eelgrass growth, transparency or dissolved oxygen ("D.O."). *Id.* at 2. Although, the DES document entitled "Numeric Nutrient Criteria for the Great Bay Estuary" (June, 2009) ("2009 Criteria Document") created this structure, i.e., contained a causal and response parameter, it did not include the necessary cause and effect demonstration identified in the Guiding Principles document and is therefore, deficient for confirming a narrative criteria violation exists due to nutrients.

4- 5

In developing a scientifically defensible numeric nutrient criterion, EPA explains, citing 40 C.F.R. § 131.10(a), under the "Sound Science Rationale" heading:

> Assessment endpoints should be relevant to the management goals (e.g., protect and maintain aquatic life) *and should be sensitive to the stressor of interest* (e.g., increased nitrogen and phosphorus concentrations). Appropriate biological response parameters will *directly link* nutrient concentrations to the protection of the designated uses.
>
> Indicators that are *most indicative* of nutrient pollution in streams are intensively measured total phosphorus and total nitrogen, *measures of primary productivity* (e.g., benthic chlorophyll a, percent cover of macrophytes), measures of the algal assemblage (e.g., algal assemblage indices), and measures of ecosystem function (e.g., continuously monitored pH and dissolved oxygen). On the other hand, *reliance on higher trophic level* indicators designed to measure general biological donation (fish or invertebrates) may not be adequately sensitive or *diagnostic of nutrient pollution.* Therefore, *these general higher trophic level indicators* may be used in a suite of response variables but *should not be the predominant or sole indicator of nutrient pollution.*

4- 6

> …
>
> The EPA recommends the use of one or multiple of these ideal response indicators when deriving a combined criterion. This criterion should demonstrate the *sensitivity of the response indicator(s) to increased nutrient concentrations* and quantify how these *nutrient-response linkages* will achieve the goal of protecting and maintaining aquatic communities.

4- 7

> …
>
> It is important to have sufficient data to all the development of quantitative relationships (e.g., via regression models). …

4- 8

Id. (emphasis added). EPA's guidance confirms that any criteria, including those applied under 40 C.F.R. Part 130 or Section 122.44(d), must be based on a "sound scientific rational" and based upon a direct causal relationship. If the criterion is not based on a direct causal relationship, then there must be evidence from the estuary supporting each link in the causal chain.

4- 9

The 2012 CALM relies on the 2009 Criteria Document to presume that TN caused impacts on higher trophic level indicators (i.e., eelgrass) and low D.O. in several upper tidal rivers. The 2009 Criteria Document was not prepared in accordance with these "guiding principles." For instance, the 2009 Criteria Documents uses general higher trophic level indicators to assume that nutrients are causing the decrease in eelgrass populations without demonstrating the sensitivity of the indicator to increased nutrient concentrations. More specifically, the 2009 Criteria Document assumes that increased nitrogen levels cause excessive phytoplankton blooms and proliferation of macroalgae which leads to loss of eelgrass population and low D.O. concentrations. However, a demonstration that these indicators in fact are causing loss of eelgrass and low D.O. in this system was never made. Therefore, the 2014 CALM should not rely on the 2009 Criteria Document as evidence that a narrative "violation" has occurred.

4- 10

In the case of nutrient impairments in the Great Bay estuary, there is no support for the causal model as DES previously determined that excessive phytoplankton growth did not occur in this system in response to TN changes and that significant changes in system transparency did not occur over time. *See also* PREP 2013 State of the Estuaries Report ("2013 SOE").[1] To be consistent with the Guiding Principles, the State would need to demonstrate that (1) cultural eutrophication is occurring (i.e., there is excessive plant growth and low D.O. in the system), (2) nutrients are causing excessive plant growth and low D.O., and (3) the condition is not naturally occurring. As admitted by DES officials under oath, the State never demonstrated that a causal link between nutrients, algal growth, transparency, or D.O. existed for this estuary. *See* Attachment 3. Additionally, DES officials admitted that the cause of eelgrass loss in the tidal rivers is unknown and that present low tidal river transparency levels are due to natural conditions which will not allow eelgrass populations to inhabit these areas. *Id.* Likewise, there is no showing that low D.O. is actually caused by excessive algal growth in the tidal rivers; to the opposite, studies conducted by the University of New Hampshire Jackson laboratory repeatedly determined that low D.O. did not coincide with elevated algal growth. Thus, there is no evidence that TN control from point sources would or could achieve the applicable D.O. and transparency targets anywhere in this system, or appreciably improve such conditions. Absent system information reasonably proving that these assumptions underlying the 2009 Criteria Document apply to this estuary, it may not be used as the basis for concluding TN is the cause of either low D.O. or low transparency in this system.

4- 11

[1] Piscataqua Region Estuaries Partnership, *2013 State of the Estuaries Report* (Dec. 8, 2012) *available at* http://www.prep.unh.edu/resources/pdf/2013%20SOOE/SOOE_2013_FA2.pdf.

The 2012 CALM should be amended to require a full cause-and-effect demonstration as required by the narrative criteria and ensure that the specific nutrient pollutant designation is removed where such information does not exist. The presumed TN concentration needed to protect eelgrass populations for Great Bay and the tidal rivers should be removed from the document as DES, itself, has acknowledged that exceedance of the criteria does not demonstrate that TN is responsible for a narrative criteria violation and TN concentrations have plainly not triggered excessive phytoplankton growth in Great Bay, Little Bay or the Piscataqua River.

4- 12

4. When implementing narrative criteria a weight-of-evidence approach should be utilized to evaluate recent data and available studies for the specific system under assessment.

It is imperative that when DES implements a narrative criteria it utilizes a scientifically sound "weight-of-evidence" approach which evaluates "all existing and readily available water quality-related data and information" as required under 40 C.F.R. § 130.7(b)(5), including recent data and available studies for the specific system. It is apparent that the State's 2012 listing decisions were not based upon all existing and readily available information for the Great Bay estuary. **4- 13**

Full consideration of the available information confirms that nutrients are not the root cause or even a major factor causing reduced eelgrass populations and low D.O. occurring within the Great Bay estuary. **4- 14**

Moreover, the review of the 2009 Criteria Document done by EPA in 2010 and relied upon by DES to support the 2009 Criteria Document, did not conduct a true "weight-of-evidence" analysis as it did not evaluate all available information. In fact, an email written by the branch chief at EPA Office of Science and Technology confirms EPA was adamant that the 2010 peer reviewers not review the Coalition's technical submissions: **4- 15**

> We had N-Step experts review the information that was provided to us by the State and *will not be opening the review up for any more information. If the State wants to take into the new information, that is their prerogative.* …

Attachment 3, at 6. This means that the State's reliance on the 2010 EPA peer review to assert that the 2009 Criteria were scientifically defensible is misplaced. EPA conducted a biased, truncated review by excluding the updated scientific information that would have shown the regression approach used to derive the criteria was simply not scientifically defensible. **4- 16**

The following is a summary of additional documents in the State's possession, confirming that the 2012 § 303(d) listings are premised on a faulty conceptual model which *assumes, but never demonstrates* that nutrients are causing eelgrass and D.O. impairments in the Great Bay estuary. Consideration of all the available analyses and data confirm that (1) TN is not causing impairments to eelgrass or D.O. and (2) excessive algal growth has not caused impairments in violation of the State's narrative criteria. At a minimum, the following documents should be evaluated as part of a weight-of-evidence approach in the listing process as they represent the most recent data and studies available for the Great Bay estuary regarding the reported effects of nitrogen on that system. **4- 17**

a. 2013 State of Our Estuaries Report

The 2013 SOE, which generally considers the most recent scientific information for the estuary, plainly does not support the need for stringent TN reductions at this time. The 2013 SOE indicates the following with respect to monitoring data for the estuary: **4- 18**

1. Algae blooms in the estuary have not increased in over 30 years (2013 SOE, at 16); **4- 19**

2. Macroalgae are an "emerging problem" that requires further investigation to assess its significance (*Id.* at 44); **4- 20**

3. Existing TN level for the Bay is averaging 0.38 mg/L TN and 0.116 mg/L DIN. DIN levels are comparable to those measured in the 1970s (*Id.* at 14); **4- 21**

4. The effect of nitrogen loads on the system is not "fully determined" and requires "additional research" (*Id.* at 12); and, **4- 22**

5. Eelgrass have rebounded in Little Bay to the highest level in decades. *Id.* at 20. (This occurred despite the existing nitrogen and transparency levels DES/EPA claims are inimical to eelgrass restoration). **4- 23**

Thus, based on this most recent report regarding the health of the estuary, there is no credible scientific basis to assert that extremely restrictive TN reduction requirements (0.3 mg/l TN) are mandated to abate a "documented" nutrient impairment. Clearly, any claim that TN has caused major increases in algal (phytoplankton) blooms or excessive macroalgae growth leading to eelgrass declines is either demonstrably incorrect or a premature conclusion in need of further assessment. **4- 24**

b. Affidavit of Dr. Steven Chapra

Dr. Chapra's affidavit highlights that analyses contained in 2009 Criteria Document, which are relied upon in the 2012 CALM to declare waters nutrient impaired, did not include the essential analyses that must accompany a defensible stressor-response analysis. Attachment 4. In Dr. Chapra's opinion: **4- 25**

> *The methods applied are, in fact, grossly incorrect, internally inconsistent and have produced results that bear no reasonable relationship to reality.* Consequently, the analysis was fundamentally flawed and the proposed TN criterion of 0.3 mg/l is not demonstrated to be either necessary or appropriate to protect aquatic resources in the Estuary.

Id. at 1. Dr. Chapra's affidavit is a streamlined assessment of the serious technical issues surrounding the 2009 Criteria Document. *Id.* at 2-10. His analysis also identifies the key components of scientifically defensible numeric criteria using EPA's 2010 "stressor-response" methodology that are necessary but absent from the 2009 Criteria Document.[2] *Id.* at 10-14. Therefore, based on Dr. Chapra's analysis it is apparent that the 2009 Criteria Document, relied upon in the 2012 CALM, is fundamentally flawed and does not provide a scientifically defensible or rational basis for declaring Great Bay estuary impaired for eelgrass and D.O. due to TN levels present in the estuary. **4- 26**

[2] In response to a recent FOIA submitted on behalf of the Coalition asking for "any records regarding EPA's review/assessment of positions, scientific conclusions, or factual statements regarding Dr. Chapra's assessment …", EPA Region 1 confirmed that it has no technical analyses showing Dr. Chapra's assessment is incorrect. *See* Attachment 5.

c. *Communications with Drs. Richard Langan and Stephen Jones from the University of New Hampshire Confirm EPA Misinterpreted the Available Studies*

Drs. Langan and Jones, both participated in the PREP Technical Advisory Committee ("TAC") (*e.g.,* Dr. Jones was the Chairman of the 2012 Committee), and served on the TAC panel that peer reviewed the 2009 Criteria Document, *i.e.,* the document that DES relied upon in making its nutrient impairment determinations. Inasmuch as DES relied upon the documents authored by Drs. Langan and Jones and claimed that these studies demonstrated that nitrogen caused the low D.O. in tidal rivers and poor transparency (*i.e.*, caused a violation of the state's narrative criteria for nutrients), the Mayors of the several New Hampshire cities thought it prudent to confirm whether DES' interpretation of the results of the underlying studies were correct. *See* Attachment 6.

4- 27

The responses from Drs. Langan and Jones, who are not paid consultants of the Coalition, confirm that DES' "weight of evidence" conclusions regarding the changes in eelgrass and D.O. are, in fact, in error. Attachment 7. For instance, with regards to whether TN is causing phytoplankton growth or reduced transparency in Great Bay, DES claims that such a link has been established, while the Coalition disagrees. The letter from the Professors confirms that, in fact, there has been no study demonstrating that TN is contributing to excessive phytoplankton growth or reduced transparency in Great Bay. *Id.* at 1-2. The remainder of the letter is replete with confirmations that technical assumptions made by DES in compiling the 2012 § 303(d) list are not supported by the available scientific studies done for Great Bay, *i.e.,* the studies which these professors authored or peer reviewed. *Id.* at 2-3. In fact, numerous assertions made by DES and EPA were actually proven to be incorrect by the federally-funded University of New Hampshire studies (*i.e.*, there is no relationship between low D.O. and algal levels in either the Squamscott or Lamprey Rivers).[3] Drs. Langan and Jones letters confirm that DES has misapplied and misinterpreted these studies when listing these waters as nutrient impaired.

4- 28

[3] In the same FOIA response where EPA Region 1 confirmed that it had no technical analyses showing Dr. Chapra's assessment is incorrect, the Region also confirmed it had no technical analyses showing that Drs. Langan and Jones statements are false. *See* Attachment 5.

d. *Deposition Testimony of Key DES Officials*

The key DES officials involved in the process of developing the 2009 Criteria Document were deposed in connection with *City of Dover v. N.H. Dep't of Envtl. Services*, Docket No. 217-2012-CV-00212. The officials deposed were Philip Trowbridge, DES Scientist and author of the 2009 Criteria Document, and Paul Currier, former Administrator of the DES Watershed Management Bureau and Mr. Trowbridge's supervisor throughout the development of the 2009 Criteria Document. In addition, Dr. Fred Short, University of New Hampshire eelgrass scientist, whose studies DES heavily relied upon in developing the document was deposed. Attached is a summary document outlining key deposition excerpts confirming:

4- 29

- Elevated TN did not cause increased algal growth impacting transparency in Great Bay.

4- 30

• Phytoplankton levels in the Estuary have not materially changed over the last 30 plus years despite the apparent increase in nitrogen levels known to stimulate algal growth.	**4- 31**
• DES does not know what caused the eelgrass changes in this system. DES stated that it was this specific eelgrass decline that lead to the estuary being listed as impaired for eelgrass.	**4- 32**
• DES and EPA specifically concluded in November 2007 that the "conceptual model" (increasing nutrients will cause reduced transparency) was not supported for this system.	**4- 33**
• Great Bay is not a light-limited system. Great Bay is not even a transparency limited system because plants receive sufficient light at low tide.	**4- 34**
• Data for the tidal rivers shows that transparency cannot be achieved regardless of TN reductions by wastewater treatment facilities due to natural conditions, algal growth impact on transparency in tidal rivers is negligible and TN control will not materially improve transparency in the tidal rivers.	**4- 35**
• If transparency levels are low naturally, an impairment, in violation of narrative criteria does not exist. Tidal rivers have naturally low transparency. (These "natural condition" that now preclude eelgrass regrowth, do <u>not</u> constitute a violation of state narrative standards for aquatic life protection.).	**4- 36**
• Low DO is naturally occurring in the system and the causes of the periodically low DO is unknown.	**4- 37**
• Mr. Trowbridge, under oath, acknowledged that it was the 2006 floods (a natural event) that could have caused the major, rapid decline in eelgrass populations but he never evaluated the effect of that event. (This 2006 decline in eelgrass was therefore <u>not</u> indicative of a violation of state standards).	**4- 38**
• Narrative criteria violations and implementation must be based on a cause-and-effect demonstration that the nutrient in question caused "cultural eutrophication" which in turn caused an impairment to the system biota.	**4- 39**
• The 2009 Numeric Nutrient Criteria were based on the "assumption" that TN caused a major change in transparency due to increased algal growth, not a "cause and effect" demonstration that such events actually occurred.	**4- 40**
• There is no data showing eelgrass loss was caused by increased macroalgae growth. Presently, there is no macroalgae impairment in Great Bay, though macroalgae populations have changed over time.[4]	**4- 41**

[4] Pictures taken in October 2012, by Dean Peschel of Peschel Consulting, LLC, at Lubberland Creek and Depot Road which are two previous cites where Nettleton studied macroalgae in 2011, support the assertion that far less macroalgae is growing. *See* Attachment 8.

- The relevant information (including DES/PREP analyses) that evaluated whether (a) TN increases had caused changes in transparency, algal levels or D.O. and (b) a "cause and effect" relationship between TN and transparency/D.O. existed, were excluded from the technical information presented in the 2009 Criteria Document and, therefore, were never presented to EPA's peer review panel.

4- 42

See Attachment 2. These deposition excerpts from DES officials who developed the 2009 Criteria Document which is the basis for the 2012 CALM, confirms there is no scientific basis upon which to conclude TN caused a violation of state narrative standards in the Great Bay Estuary.

4- 43

e. Studies plotting changes in eelgrass over time in relation to rainfall data

As is evident from the charts below, declines in eelgrass populations for Great Bay directly correspond to rainfall. The massive declines in eelgrass in 2006 and reported declines in eelgrass this year are plainly related to these two years being the two wettest summers in the last 100 years. These declines are expected because much lower transparency occurs during very rainy years due to the increasing CDOM loads from the tidal rivers.

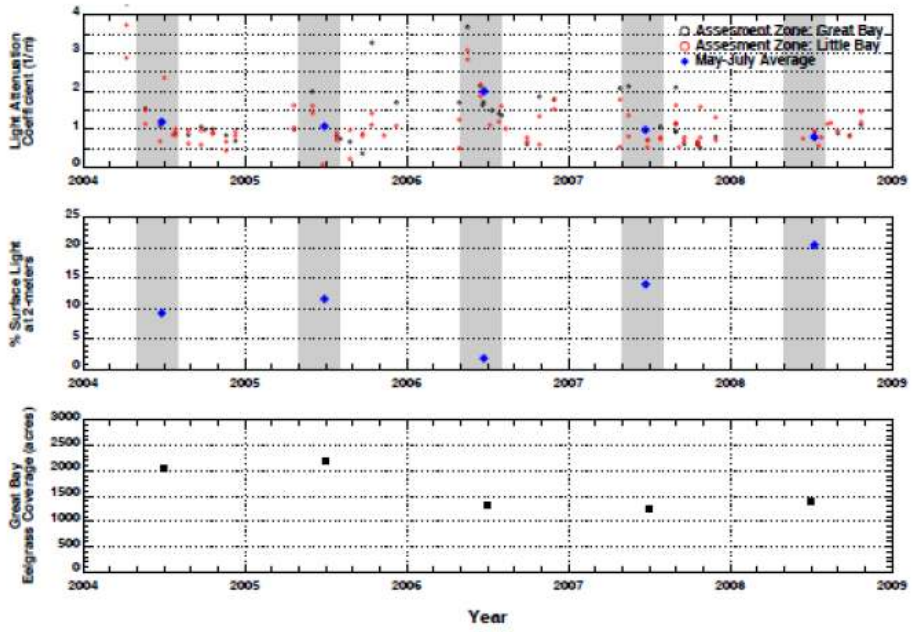


Figure 1. Great Bay & Little Bay Measured Light Attenuation Coefficients and Great Bay Eelgrass Coverage (2004-2008)

/coraid/haas00040/wq/pmkd_cdom_buoy.gdp

4- 44

Although the Bay is generally not a light limited system during any typical year, it is in a very wet year. This change in transparency is not accompanied or caused by major phytoplankton blooms – it is natural and therefore, not a violation of state standards. Thus, DES has no analyses or documents showing that TN caused (1) a violation of narrative standards, (2) was responsible for eelgrass decline or (3) caused low D.O. to occur in the tidal rivers. Consequently, if DES had done a more complete weight-of-evidence approach for the Great Bay Estuary, then neither the Piscataqua River nor Little Bay/Great Bay would have been listed for nutrient impairments in 2012. Accordingly, the 2014 CALM should be amended to require, when implementing a narrative criterion, a weight-of-evidence analysis must be conducted which evaluates recent data and available studies for the specific system to properly determine whether a waterbody is impaired.

4- 45

5. Before the proliferation of macroalgae is used as the basis for listing a waterbody impaired for nitrogen, a more detailed assessment of the effects/causes of macroalgae growth is needed.

The conceptual model used by DES to justify listing different water segments in the Great Bay estuary as impaired due to nitrogen, is premised on the assumption that increasing nutrient concentrations are having adverse effects on eelgrass populations through the proliferation of macroalgae even though this relationship has not been demonstrated for this estuary. Moreover, regarding the ecological concerns presented by macroalgae there are several factors that need to be considered:

4- 46

1. Mr. Trowbridge previously testified that macroalgae are not identified as an ecological problem in any of the tidal rivers. Attachment 3, at 8. It is not apparent that the existing macroalgae growth is impairing the bays ecological resources. *Id.*

2. Mr. Trowbridge did not oppose Dr. Short's findings that current macroalgae growth has not been demonstrated to prevent eelgrass restoration anywhere in Great Bay. It should be noted further, that macroalgae in Great Bay, grow predominantly on tidal flats that do not support eelgrass. Regardless of macroalgae levels, eelgrass populations in Great Bay rebounded roughly 40% from 2007-2011. *Id.*

4- 47

3. In the past 4 years, macroalgae growth has apparently begun to increase in the intertidal areas (mud flats exposed at low tide) but eelgrass population regrowth, occurring in deeper waters, does not appear to be materially impacted. *Id.*

4- 48

4. How to control macroalgae growth is not well understood. Simply presenting data on changing macroalgae growth provides little insight on the causes of and options for controlling macroalgae growth. If these are invasive species, it may not be possible to limit their growth. In fact, we now appear to have more macroalgae growth at *lower* nitrogen levels than occurred in the mid-1990s when eelgrass growth was robust. Unless the relationship between TN levels and macroalgae growth is adequately defined, the utility of controlling point source TN is simply unknown.

4- 49

5. More recent physical evidence (pictures of sites addressed by Nettleton in 2008) shows far less, if not minimal, macroalgae growth in the same locations in the fall of 2012. *See* Attachment 8. Why this change has occurred is unknown but certainly underscores that the 2009 Nettleton report and pictures therein, cannot be used as evidence nitrogen has caused dramatic changes in macroalgae. Such growth is plainly ephemeral, changes year to year and its significance needs to be studied further.

4- 50

6. The 2009 Criteria Document addresses the problem of macroalgae proliferation affecting eelgrass populations in Great Bay in less than one page of this 120 page document, showing that DES did not believe macroalgae growth was a primary concern for eelgrass protection in the Great Bay Estuary. Moreover, the 2012 draft 303(d) list does not claim there is an existing macroalgae impairment anywhere in the Great Bay system. If there was a clear, scientific basis showing macroalgae growth in Great Bay is ecologically detrimental, then presumably the 2012 draft 303(d) list would have shown macroalgae impairments in the Great Bay Estuary.

4- 51

Given these circumstances, it is inappropriate for DES to seek the imposition of stringent TN criteria, as both the level of control necessary and the ecological need for macroalgae reduction are unknown at this time. In particular, the 2012 macroalgae pictures show such plant growth has greatly decreased since the 2008 Nettleton survey. Again, this counsels for an iterative approach to nutrient management lead by further scientific investigation.

4- 52

Additionally, the Piscataqua River and Little Bay have no demonstrated macroalgae problem, yet these waters have been listed as impaired. As stated in the 2013 SOE, macroalgae are an "emerging problem" in the Great Bay estuary (at 44), for which little is known, therefore, a more detailed assessment needs to be conducted to determine if macroalgae have reached excessive levels due to elevated nitrogen levels in this system. Such an assessment should (1) differentiate between native species and invasive species which can flourish in waters with low nitrogen concentrations, (2) consider the highly variable nature of macroalgae growth which can be affected by multiple factors including weather patterns, and (3) evaluate the specific nutrient levels present in areas where macroalage are present in excessive levels and absent.

4- 53

After such an assessment has been completed, if the "weight of evidence" indicates that macroalgae have reached excessive levels due to increased nutrient levels as predicted by the conceptual model, then DES should control the specific form of the pollutant which promotes macroalgae growth- DIN, not TN. DIN is the form of nitrogen documented to be primarily responsible for stimulating macroalgae growth. *See* Attachment 9, at 4-6; Attachment 7, at 3. Therefore, if macroalgae proliferation is having adverse effects on eelgrass populations due to increased nutrient levels, controls on DIN, not TN, should be implemented.

4- 54

6. D.O. impairment listings must be based on a cause-and-effect relationship not an assumed relationship between D.O., algal levels and TN.

D.O. impairment listings must be based upon a causal relationship which demonstrates a relationship between D.O., algal levels, and TN instead of an assumed relationship between these conditions as has occurred for the Cocheco River listing. Every study ever conducted for the estuary demonstrates that lower D.O. in the tidal rivers does not coincide with elevated algal growth and that system hydrodynamics or other factors play the major role in the occurrence of low D.O. conditions. *See* Attachment 10.[5] The Lamprey River, which has the best reported algal

[5] *See* Steve Jones, *Impacts of Wastewater Treatment Facilities on Receiving Water Quality* (Apr. 2007), *available at*, http://www.prep.unh.edu/resources/pdf/impacts_of_wastewater-unh-07.pdf; Steve Jones, *Incidence and Timing of Low Dissolved Oxygen Events in the Squamscott River: 2005-07* (July 2008), *available at*, http://www.prep.unh.edu/resources/pdf/incidence_and_timing-nhep-08.pdf; Jonathan Pennock, *2004 Lamprey River Dissolved Oxygen Study* (2005), *available at*, http://prep.unh.edu/resources/pdf/2004-lamprey-river-dissolved-unh-05.pdf.

4- 55

condition (averaging about 7 ug/l) has the worst low D.O. conditions. These D.O. conditions are not and physically cannot be caused by the degree of algal growth present. *See* Attachment 4, at 6-10. The only possible exception being the Squamscott River where the discharge itself is contributing to high algal levels in the system which should increase SOD and stratification is not apparent. *See* Attachment 10; Jones (2008), *supra* n. 5. Low D.O. can be caused by a host of natural and man-induced conditions (e.g., presence/absence of tidal marshes, effect of increased tidal exchange, variation in sediment oxygen demand, differing stratification, etc.). Therefore, in light of the available studies, there is no reasonable basis to conclude that low D.O., which is influenced by many non-nutrient factors, is caused by elevated TN levels in these areas. Thus, D.O. impairment listings should not be based upon assumptions but rather a clear cause-and-effect demonstration that lower D.O. in the tidal rivers is caused by elevated algal growth. Absent such analysis the impairment listing should be removed or listed as "cause unknown."

7. With regards to Bacteria, the State is listing portions of the Great Bay estuary as impaired with the assumption that POTWs or stormwater are causing or significantly contributing to the impairment.

DES is listing portions of the Great Bay estuary as impaired for bacteria based upon the assumption that the receiving waters are, once again, in fact impaired and that stormwater discharges are causing or contributing to the impairment. *See, e.g.,* 2012 § 303(d) list, Assessment Unit ID NHEST 600031001-11 Upper Portsmouth Harbor (Portsmouth). However, prior to listing these waters as impaired, DES should confirm that the (1) receiving waters are actually impaired by the specific parameter and (2) that municipal sources are significant contributors to the impairment. These impairment listings are not always accurate for a number of reasons. For example, waters may have been assessed as impaired due to a limited amount of data or unrepresentative data for the waterbody. Unidentified natural sources may have been responsible for the impairment listing (e.g., geese) but as no assessment occurred, the actual cause of the condition is unknown. Or, the listing may simply have been in error as was the case for the nutrient impairment listing for Paxton Creek in Pennsylvania (*i.e.*, the waters are simply not exhibiting a nutrient impairment). Thus, DES should confirm that the waters are in fact impaired for bacteria due to man-induced activities and that stormwater (instead of CSOs) are causing or contributing to the impairment to avoid misallocation of state/local resources.

4- 56

8. The results from the updated peer review regarding numeric nutrient criteria for the Great Bay Estuary should be considered in future listing decisions.

DES and the Coalition agreed in April 2013, that an updated peer review of the 2009 Criteria Document was appropriate. The updated peer review was prompted, in part, by new data for the estuary, discussed above, confirming that changing nitrogen levels had not caused increased algal growth in the system (*see* 2013 SOE, *supra* n. 1) and local experts confirming many of the assumptions underlying the 2009 Criteria Document were not consistent with results of studies for the estuary and/or acceptable scientific methods for deriving such criteria. *See* Attachments 4 and 7. Moreover, the updated peer review comes in the wake of EPA releasing documents confirming (1) EPA prevented the 2010 peer review from considering the Coalition's major objections to the 2009 Criteria document[6] and (2) there was bias on the part of at least one of the peer reviewers and on the part of EPA's contractor's manager.[7] *See* Attachment 3.

4- 57

[6] EPA states in those documents:

> The Coalition, or its representatives, developed several sets of additional comments on the 2009 Criteria document after the March 20, 2009 close of the public comment period (referred to as 'the subsequent Coalition comments'). On May 12, 2010, the Coalition transmitted comments to NHDES and EPA, entitled "Assessment of Appropriate Peer Review Charge Questions Numeric Nutrient Criteria for the Great Bay Estuary, New Hampshire." On June 7, 2010, the Coalition submitted their May 12, 2010, comments as well as a final report from EPA's Scientific Advisory Board directly to Drs. Boynton and Howarth. [footnote omitted]. *EPA shortly thereafter decided that these and any further comments would not be allowed within the authorized scope of Drs. Boynton and Howarth's peer review.*

Attachment 3, at 2 (emphasis added).

[7] These email documents also reveal personal bias on the part of at least one of the reviewers and EPA's contractor's manager who characterized the Coalition's technical comments in a disparaging manner:

> It's a little sad to see [the comments] coming from the City of Portsmouth. … Now, [the City of Portsmouth] is a haven for very wealthy people who enjoy the NH seacoast and lack of income tax, while commuting to Boston for work. They can probably afford to pay to clean up their discharge. . . . . .

Attachment 3, at 5 (email from Dr. Howarth, one of the 2010 peer reviewers).

> By the way, thanks for doing such a sound review. You know you are doing something meaningful when you get emails from people at firms with lots of last names in it. Clearly there are dischargers in NH that are concerned with what nutrient criteria mean for their operations. John Hall is a national attorney (Hall and Associates) who has been challenging limits on nutrients on behalf of dischargers nationwide. I am not surprised he has surfaced in one of the first estuaries battlefields. Again you know it's important when the lawyers get involved. I am sure both of you are familiar with that … sadly.

Id. (email from Mike Paul, manager of EPA's contractors to the peer reviewers).

DES has decided it is time to consider the new information and has agreed to an updated peer review which would consider all the information previously provided to, and ignored by, EPA in the 2010 peer review. The updated peer review is under way. The four national experts have been selected to conduct the review and render their report on the scientific validity of the 2009 Criteria Document and make recommendations as to how we move forward to address nutrient regulation in the Great Bay Estuary. The updated peer review is expected to be completed by January 29, 2014. Therefore, we request that DES, once the peer review is completed, take into consideration the result of the updated peer review in further listing determinations and the proper use of the 2009 Criteria Document.

4- 58

9. **With regards to eelgrass, the use of reconnaissance level eelgrass mapping to establish the minimum acreage standard and use of such standard in determining impairments should be revised.**

Eelgrass mapping conducted by the University of New Hampshire using reconnaissance level eelgrass mapping has been used since 1986 in this estuary to develop the minimum acreage standard for a non-impaired estuary by DES. This standard is then compared to the annual mapping results to determine where eelgrass impairments exist in the estuary. However, the protocol has changed over time, along with varying study conditions from year to year, making it difficult to compare the data of eelgrass coverage from year to year or over the years in question. New England Environmental Strategies ("NEES") conducted a detailed review of the 2010 methods and procedures used to develop eelgrass coverage data to assess its scientific validity. Attachment 11. NEES concluded:

> NHDES has determined that eelgrass cover is an appropriate indicator for water quality impairment determinations in Great Bay because supporting data are "collected using accepted and standardized protocols and is ground-truthed annually." However, eelgrass mapping data generated by the UNH Eelgrass Monitoring Program, and described in UNH (2010), are based on equipment and methodology that are not consistent with the nationally recognized NOAA C-CAP standards or industry standard practices for mapping of natural resources based on aerial imagery interpretation. Furthermore, ground-truthing methods described in UNH (2010) are not adequate to determine the spatial accuracy of eelgrass mapping data. These data are therefore considered to be reconnaissance level quality, generally suitable for use as a means to identify broad areas of suspected change.

4- 59

Id. at 5. We certainly agree that eelgrass acreage is important as an indicator of the health of the estuary. However, it is clear that the methodology used to map the distribution of eelgrass in the estuary should be revised to be more appropriate for its intended use. Moreover, it is also apparent that variability on the year to year acreage estimates is subject to much greater uncertainty than originally reported by Dr. Short and specified in the quality assurance plan. Therefore, the 2012 CALM should note this uncertainty and indicate that a 20- 30% variation in eelgrass acreage from the median condition of 2150 acres will be considered in assessing whether or not eelgrass resources are stressed from natural or man-induced conditions. By applying this range, there will be a greater opportunity to exercise professional judgment in deciding whether or not adverse eelgrass population trends are actually occurring or are an artifact of the measurement method.

Conclusion

Thank you for your consideration of these comments. We look forward to the Department's response.

4- 60

COMMENT # 5: Manchester - Ricardo Cantu - Highway Department, Environmental Protection Division, Superintendent

Kevin A. Sheppard, P.E.
Public Works Director

Timothy J. Clougherty
Deputy Public Works Director

Frederick J. McNeill, P.E.
Chief Engineer

CITY OF MANCHESTER

Highway Department
Environmental Protection Division

October 11, 2013

Ms Vicki Quiram and Mr. Ted Diers
NHDES
PO Box 95
29 Hazen Drive
Concord, NH 03301

13-18-PS

Re: Manchester Comments on the CALM

Dear Administrators:

5- 1

The City of Manchester has reviewed the CALM and has the following to offer as comments on this document. Underlined sections in blue are the suggested addition/changes the City offers to the CALM language with a notation at the end of the comment explaining why the City believes this change is warranted.

In Section 1.1.2 – Assessment and Listing Methodology the following addition is suggested, *"Any data submitted to the New Hampshire Department of Environmental Services (the department or DES), is first reviewed against the existing protocols in the CALM document. In the event the CALM does not include protocols to adequately assess a particular data set, DES staff review the data in the context of New Hampshire's water quality standards within six months of receipt and prepare a written summary within nine months of receipt that includes a review of the data, the applicable water quality standards, and a recommendation of attainment status. Nothing in the CALM shall be construed as a basis for not evaluating a submitted dataset."*

Note: Manchester submitted a detailed Aluminum Study that was completed over the 2009 – 2010 time period with final report submitted to the NHDES by March 1, 2011. As of the writing of these comments, Manchester has not heard a response to the report, or has even had any indication that the information has been reviewed. The intent of this section is to review all submitted data. The question is the timeliness. As outlined in the CALM, the collected data is no longer considered in date after five years. The last samples were collected in May of 2010. In June of 2014 the May 2009 data will be outdated (less than a year away). It is imperative that the response be timely.

In Section 1.2.2 – Integrated Approach for 305(b) / 303(d) it is suggested that an item d. be added at the end of section 4.

1. Impaired or threatened for one or more designated uses but does not require development of a TMDL because;
   a. a TMDL has been completed, or
   b. other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future, or
   c. the impairment is not caused by a pollutant.
   d. the impairment is naturally occurring

Note: This should be done to finalize any Assessment Unit (AU) segment from further scrutiny and to allow the NHDES and communities to focus efforts on other AUs. Manchester, believes the segment of the Merrimack River, from the Queen City Bridge (upstream of the WWTP outfall) and the railroad bridge (downstream of the WWTP outfall) has conclusive proof that the Merrimack River is well below the aluminum chronic criteria of 87 ug/l (<40 ug/l where the measured results) when the 7Q10 was 3X or less. High levels of aluminum in the feeder ponds in the White Mountains (95% of the samples were over 100 ug/l for aluminum) wash out during storm events and inundate the upper reaches of the Merrimack River. This aluminum increased the river loading during storm events and settles out when the storm events happen in the White Mountains and there is no rain in the lower watershed. This aluminum laden sediment is scoured off the bottom the Merrimack when the cfs approaches 7,000 (around 8X the 7Q10) in the aforementioned section of the Merrimack. Countless man hours and several thousand dollars have been spent generating this data and it should have major weight of evidence in reviewing impairment as all the samples were of excellent value and done under clean sampling techniques.

5- 2

In Table 3-1: Factors used to establish Homogenous and Manageable AUs the following row has and additional qualifier,

Outstanding Resource Waters	Outstanding Resource Waters are defined in the surface water quality regulations (NHDES, 2011) as surface waters of exceptional recreational or ecological significance and include all surface waters of the national forests and surface waters designated as natural under RSA-483-7-a, I, regardless of impairments due to natural occurrence.

5- 3

Note: as previously explained, the White Mountains are a high source of aluminum and the source of aluminum impairment in the Merrimack River. If natural occurrence is causing the impairment, it needs to be referenced in the document. The current statement, without the qualifier, leads one to believe that there is no chance any pollutant can be coming from outstanding resource waters which is not the case.

In Section 3.1.4 - Use Support Attainment Options and Threatened Flag, Manchester would suggest the following changes:

Threatened: For any of the use support options noted above, the ADB allows any parameter in an AU to also be flagged as threatened. For this assessment cycle, threatened waters were defined as follow:

5- 4

- Waters which are expected to exceed water quality standards by the next listing cycle (every two years). Expectations must demonstrate that the waters have reached 90% of the WQ maximum allowable concentration in at least two samples to meet expectation to exceed and/or,

- Waters that do not have any measured in-stream violations but other data indicate the potential for water quality violations [i.e. see Sections 3.1.20 (predictive models) and 3.1.21 (NPDES permit effluent violations)]. Predictive models must be run with the average of the previous two years of in-stream flow, the average of at least four of the highest pollutant parameters over the past four years and the model validation run must be within 15% of and actual measured run to be considered valid.

Note: Models have demonstrated unreliability and do not demonstrate real world potential. Models are generally based on the highest concentration of pollutant measured, the full capacity of the treatment works, and require several major adjustments to the modeling criteria meet calibration criteria. Manchester's secondary treatment plant is currently designed for 34 mgd, a BOD loading of 96,000 lbs and a TSS loading of 112,000 lbs. This was the 20 year future facility design in 1976 when the plant went into operation. Thirty eight years later, the plant averages 18.47 mgd (54% of design), 12,911 lbs BOD (13.4% of design) and 26,605 lbs TSS (23.75% of design). The plants 2012 data is below. With this history, models and NPDES calculations are still using worse case conditions. The 7Q10 criteria (lowest week in a 10-year period or one occurrence in 520 events (a 99.8% probability of non occurrence) with a 10% assimilative safety factor is a highly protective factor for WQ criteria. Models should be run on rolling average or maximum actual conditions and not future assumptions that rarely if ever transpire. As permits are issued every five years, and there is protective language within the permit to stop violations should they occur, there is no need to base models on anything other than actual plant and in-stream data.

5- 5

Date	Plant- Eff Monthly	Plant Inf.	Plant Inf.
2012	Flow (MG)	Total BOD lbs	Total TSS lbs
Jan.	640.80	329,222	741,944
Feb.	516.20	325,839	547,265
Mar.	616.20	334,931	646,828
Apr.	547.30	364,297	833,250
May	657.70	360,937	896,908
June	684.20	350,210	1,013,538
July	452.90	330,518	879,873
Aug.	515.90	244,429	821,980
Sept.	461.50	434,094	838,204
Oct.	543.90	529,185	982,010
Nov.	553.20	527,022	688,401
Dec.	550.00	581,804	820,471
Avg:	**18.47**	**12,911**	**26,605**
Total:	6739.80	4,712,488	9,710,672

In section 3.1.10 – Data Quality, Manchester would offer the following comments in that table:

Level of Information	Description *	Assessment Applicability	Use Support Option(s) that can be used with this level of information
Low	SOPs or QA/QC plan are not available or were not provided. SOPs or QA/QC plan is available but protocols were not followed, Field duplicates and/or blanks were outside the 30% error range. QA/QC results are inadequate, and /or there is inadequate metadata.	Screening Level assessments only	Not Assessed
Fair	SOPs or a QA/QC plan is available; SOPs were used for field and lab; Field duplicates and/or blanks were within the 20% to 30% error range. QA/QC protocols were followed and QA/QC results and metadata are adequate; Samplers had some training;	Final Assessments	"Insufficient Information" "Fully Supporting" "Not Supporting"
Good	An acceptable QA/QC plan is available; SOPs were used for field and lab; Field duplicates and/or blanks were within the 10% to 20% error range. QA/QC protocols were followed and QA/QC results and metadata are adequate; Samplers were well trained.	Final Assessments	"Insufficient Information" "Fully Supporting" "Not Supporting"
Excellent	An acceptable QA/QC plan is available; SOPs were used for field and lab; Field duplicates and/or blanks were within the 1% to 10% error range. QA/QC protocols were followed and QA/QC results and metadata are adequate; Samplers were well trained and audited.	Final Assessments	"Insufficient Information" "Fully Supporting" "Not Supporting"

Note: The CALM gives the same weight of worth to samples within the fair, good and excellent range. Manchester staff was trained in clean sampling techniques, undertook a cleaner sampling

5- 6

technique with effluent sampling and has reviewed results of clean sampling vs. non clean sampling technique. The variations are large enough to warrant a difference in the fair, good and excellent categories. Manchester's NPDEs permit of 2008 has the following data within the fact sheet for aluminum. June 17, 2005 (480 ug/l aluminum), July 15 2005 (110 ug/l aluminum), June 16, 2006 (195 ug/l aluminum) and on July 14, 2006 (334 ug/l). The NHDES would consider these samples taken under the Good to Excellent category. This fact is also recognized in Table 3-32 of the current CALM.

In Manchester sampling of the Merrimack River in the 2009 summer season demonstrated that with the river is at general navigable conditions (usually less than 6,000 cfs) samples were under the 87 ug/l chronic criteria. Nothing is known to have changed the river water quality between 2005 and 2009, yet the difference in results is considerable. The only difference with the quality of the data is the less concentrated samples were taken under clean sampling conditions where the higher concentration samples were not. More thought needs to be given to the weight of evidence and terminology obtained within these three categories.

5- 7

In Section 3.1.14 - Definition of Independent Samples, the City would propose the following:

"Where there were multiple samples (including samples taken at different depths) taken on the same calendar day and located less than 500 feet horizontally from each other, the worse case value was used as the independent sample for that day and location unless otherwise noted in Section 3.2. For Class B lakes, ponds and large impoundments, it should be noted that only data from the upper layers (i.e., the epilimnion in stratified waterbodies or the top 25% in non-stratified waterbodies) was used for assessment of dissolved oxygen. For all other parameters samples from all depths were considered and an average of the thee highest values were used as the independent sample for that day and location."

5- 8

Note: If there is a big difference at varying depths, something obviously is going on that may not be representative of that water body. To take a one-time highest snapshot as the only criteria for regulatory compliance is overly conservative. An average of the three highest would smooth out any non representative condition. This would fall in line with the thinking under the 10% rule which states, *"This is consistent with the previously stated premise that an assessment will not be based on just one sample."* The independent sample is the worse case of one sample.

In Section 3.1.17 Minimum Number of Samples - 10 Percent Rule

"The concern was that some water bodies were not being listed which were actually impaired. In response to these concerns DES decided to abandon the binomial approach starting with the 2006 cycle and adopt a 66% more stringent ten percent rule (i.e. 10% rule) for determining use support."

Note: A 66% change in criteria is very stringent, not slightly stringent. An actual percentage change is more accurate than the subjective term less. It would also be welcomed to see a footnote where these instances have occurred to show there was truly a need to change from the binominal to the 10% rule approach and not because of a subjective request without any back up evidence of this actually being the case.

5- 9

In the next section of the 10% rule the following changes are recommended,

"There are a few exceptions to the 10% rule. The first is for situations where 10% of the total number of samples is less than ten. In cases where the samples were taken in the excellent category, only two

samples are used to determine compliance. In cases where the sampling was in the good category only three samples need to be taken. In samples that fall within the fair category, five samples need to be taken to satisfy the minimum sampling criteria. In such cases, the above enumerated minimum samples is used to determine compliance. This is consistent with the previously stated premise that an assessment will not be based on just one sample. The second exception is for relatively large exceedances of the criterion. In such cases, only two exceedances are needed to assess the water as impaired. This is discussed in more detail in section 3.1.18 "Magnitude of Exceedance Criteria". The third exception is that the 10% Rule is not used for probabilistic assessments (see section 3.1.27). Finally, the fourth exception is that this rule only applies to certain parameters. To determine the parameters which were dependent on the 10% Rule for making assessments, see Section 3.2."

'The 10% rule is primarily intended to address situations where samples violate criterion but not by large amounts (i.e. values are within the accuracy of sampling (fall within the fair, good or excellent range) and method of analysis). For example, consider a data set containing 20 dissolved oxygen (D.O.) samples where the accuracy of sampling and measurement is +/- 0.5 mg/L. Further, assume only one of the samples (less than 10% of the total samples) violates the instantaneous D.O. criterion of 5 mg/L but by less than 0.5 mg/L (assume the value is 4.6 mg/L). Assuming that all 20 samples were collected under critical or near critical conditions, and applying the 10% rule, the AU would be assessed as fully supporting for D.O. and the single 4.6 mg/L value would be interpreted as due to measurement error. If, however, 2 or more of the 20 samples (i.e. greater than or equal to 10% of the samples) had values less than 5.0 mg/L, the AU would be assessed as impaired for D.O. if the sample was considered in the excellent category. It would require three or more samples for the good category and five or more in the fair category. In other words, the fact that 10% or more of the samples exceeded the criterion, and the sample fell within either the fair, good or excellent criteria is reason enough to conclude that the exceedances are not due to measurement error alone and that violations of the water quality criterion actually exist."

Note: This follows the reasoning previously outlined.

In Table 3-2: Sample Size and Minimum Number of Exceedances (10% Rule) the following suggestion is offered

Sample Size	Minimum # of exceedances to assess a waterbody as impaired
1-29	2
30-39	3
30-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

Note: The 66% reduction from the binominal approach to the 10% rule corrects for minor differences in the error between sample lot rounding. Using the table as proposed in the current CALM actually reduces below the 10% rule in certain sample lot sizes. There is enough protection within the CALM to stick with the true 10% rule.

In Section 3.1.18 - Magnitude of Exceedance Criteria (MAGEXC) the following is suggested.

"The 10% rule discussed in the previous section provides a reasonable tool for determining the minimum number of water quality violations needed to assess a water as impaired under most conditions (i.e. when sample exceedences are generally within the range of sampling and analysis error). It does not, however, account for situations where water quality criteria are exceeded by large amounts and it is obvious that there is an impairment. In such cases, just a few samples should be needed to make an impairment decision when no other reasonable explanation can be made for the large exceedence. "

'To address these situations, "Magnitude of Exceedance Criteria" (MAGEXC) were established for many of the assessment parameters presented in Section 3.2. As shown in Section 3.2, MAGEXC are typically set well beyond the standard water quality criteria or as a function of measurement precision +/- the standard criteria; consequently when MAGEXC criteria are exceeded, one can be reasonably confident that there is an exceedence of the water quality criteria. As a general rule, if two or more samples exceeded the MAGEXC, waters were assessed as impaired (i.e. not supporting), regardless of the total number of samples taken (when no reasonable explanation could be made for the large exceedence e.g construction activity, high flows with river scouring velocities, field fertizilation etc)."

5- 10

Note: As pointed out in Manchester's Aluminum Report, specific construction projects created hot spots when samples were taken within this vicinity. This is an aberration and not the norm and is handled within MS4 permits. These instances should not be the basis for WQ compliance going forward when the source of contaminant is known.

Section 3.1.20 - Use of Predictive Models, the City has the following suggestions:

A waterbody with potential violations based on predictive modeling, was assessed as threatened instead of impaired (not supporting), to reflect the fact that the violation is predicted and not based on actual measured in-stream violations, provided that the following conditions apply:

- The model is calibrated and verified and is considered to be representative of current conditions. The most liberal model shall be used when any parameter of all the reviewed models need adjustment by >25% to either calibrate/validate the model. Any model that requires the adjustment of any parameter by more than 40% shall not be used.
- The model predicts water quality violations under existing loading conditions, and/or under enforceable pollutant loadings stipulated in a NPDES permit.
- All foreseeable activities, abatement strategies and pollutant expectations are entered into the model to provide a reasonable projection of WQ in the future.
- Input parameters have been reviewed by both the affected community and the NHDES and thoroughly vetted for all possible inconsistencies.

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Assuming that vetted modeling predicts a violation, and assuming that this is the only violation in the waterbody, such waters were assessed as threatened and assigned an Impairment Category of 4A, 4B, 4C, or 5 depending on the cause of the threat (pollutant or nonpollutant), the source(s) of the threat, if a TMDL was necessary or if other controls would result in attainment of water quality standards.

Note: Modeling is never truly accurate at predicting future compliance and should only be assessed as a tool for indication of what direction compliance may take in the future. When data is entered into a model, and the output doesn't calibrate with actually measured criteria, the model input data is changed, and sometimes significantly, to make the model fit the waterbody. Included as Attachment 1 are several key pages from the CEI modeling that was used for the Nutts Pond watershed in 2009. As can be seen from the underlined highlights, the model predicted a outcome of 282 ug/l of TP when the

actual in-pond measured TP was 28 ug/l. The model had to be adjusted 91% to meet calibration requirements and is the most liberal model that was used in NHDES five-model average calibration TMDL for Nutt Pond. As can be noted from the modeling effort, this is hardly based on sound science.

In the section 3.1.21 - Probabilistic Assessments, the City would offer the following:

"One of the goals of Section 305(b) of the CWA is to assess all surface waters. To assess a large population such as surface waters, there are two generally accepted data collection schemes. The first is a census which requires examination of every unit in the population. Census sampling will always carry more evidential weight than separate probabilistic assessments. This, however, is usually very expensive and often impractical."

"A more practical and economic approach is to conduct a sample survey which involves sampling a portion of the population through probability (or random) sampling. Random sampling ensures that no particular portion of the population being sampled is favored (or biased) over another. Results of sample surveys can be used to make statistically based inferences (i.e., probabilistic assessments) about the condition of the population as a whole. For example, if a sample survey was conducted on representative lakes that exhibit similar environmental conditions of all NH lakes, and 30% of the random samples indicated aquatic life use impairment, it could be stated that 30% of the all lakes were impaired for aquatic life. Another benefit of sample surveys is that statistical analyses can also be conducted to determine the margin of error or confidence limits in the assessment."

"Probabilistic assessments are most useful for Section 305(b) reporting purposes because they can provide a general overall idea of the condition of an entire waterbody type (i.e., all rivers or lakes) which might otherwise be impossible to do using the census approach. General rules for conducting and using probabilistic assessments for surface water quality assessments in New Hampshire, include the following.

- *Probability assessments shall be conducted in accordance with accepted statistical practices.*
- *Sampling shall be based on a random sampling design of similar class waterbodies.*
- *Sample surveys should be designed to produce an estimate of the percent of the resource (e.g. all lakes) in any use support category (e.g. fully supporting, not supporting, etc.) that are no more than +/- 20% at the 95% confidence limits.*
- *Criteria for determining use support shall be in accordance with this document. (All the subsequent text on this bullet removed)*
- *The percentage of discrete random samples meeting each use support category can be used as an estimate of the percentage of the resource meeting each use support category of similar waterbodies. For example, if 20% of the discrete random samples taken in similar lakes indicate full support of aquatic life, then it can be reported that 20% of the similar lakes fully support aquatic life."*

5- 12

Note: Census sampling is rare, but should be the overriding determination of watershed compliance when available. The lakes should be representative of other waterbodies to which they are being compared. A single random sample should never be used by itself to make discrete use support decisions.

In Table 3-3: Parameters and Thresholds for "Best Possible" and "10% Reserve Tier1/Tier2, the following should be stated before the table. The 10% assimilative capacity will be waived in any non-State controlled waters (e.g. ponds and streams residing solely within municipal borders). The affective community determines if the 10% rule should apply.

At the end of the table a statement should be inserted that says, Chlor-a is the limiting parameter of concern. If Chlor-a is within WQ parameter, TP is not considered as limiting.

5- 13

Note: Many municipalities would chose to use all the capacity available to them within their town borders and solely owned by the municipality. There is no reason they should pay additional cost for compliance for non-use when it is available and is an arbitrary number set by the regulatory community. There is confusion as to whether or not there is an actual TP limit within the regulated community. Chlor-a is the limiting concentration that drives nutrients. This is outlined in the CALM, but only for ALUS thresholds. To avoid confusion, similar criteria needs to be provided for non ALUS waterbodies.

In the section that has Indicator 3: Chlorophyll-a (Chl-a) the following change is suggested. Excessive algal growth (high biomass and high chlorophyll-a values) can impair the public safety and aesthetic enjoyment of surface waters. The General Water Quality Criteria (Env-Wq 1703.03) require that surface waters be free of substances which: produce color or turbidity making the water unsuitable for the designated use, or interfere with recreational activities (Env-Wq 1703.03 (c)(1) c & e). For assessment purposes, chlorophyll-a concentrations in excess of 15 ug/L with the following turbidities;In Class A waters only natural levels of turbidity and in Class B waters no turbidity in excess of 10 NTU, (see Indicator 21) in fresh water and 20 ug/L in salt water are indicators of excessive algal growth that interferes with recreational activities.

5- 14

1. Exceedances of the water quality criteria (WQC) are defined as:

   Freshwater: Chl-a $\geq$ 15 ppb (NHDES, 2003c) & NTU Indicator 21

   Tidal Waters: Chl-a $\geq$ 20 ppb (NHDES, 2003d)

Note: Chlorophyll-a impedes light penetration. The expectation is that chlor-a and turbidity go hand in hand. There is a document (Attachment 2) that indicates that chlorophyll-a, when filtered in the laboratory as opposed to field filtering is always higher in content. By using turbidities in conjunction with the chlor-a it rules out the error from laboratory filtering.

Comments regarding Indicator 2: - Discharges of Untreated Sewage area as follows:

FS: There are no known discharges of untreated sewage.

NS: There are known or highly suspected discharges of untreated sewage.

PS: There are known agriculture activities above the sampling location that may contribute to increased bacteria count.

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Notes:

1. The primary pollutant of concern in untreated sewage is bacteria (pathogens).

2. Examples of sources of untreated sewage discharges include connections of sanitary sewer pipes to storm drains (i.e., illicit connections), combined sewer overflows (CSOs), sanitary sewer overflows (SSOs),failing septic systems that discharge to surface waters and agricultural activities upstream of sampling location that use animal/human waste as a fertilizing product

3. Investigations may find evidence of discharges of untreated sewage include physical evidence (feces, toilet paper, etc.), odors of sewage, chemical evidence (i.e., chlorine or elevated levels of ammonia in a pipe) and / or elevated bacteria concentrations in the pipe (>=2,000 cts/100mL) and manure spreading activities. An in-pipe concentration of >= 2,000 cts/100mL is an indicator of illicit sewage or waste discharge as it is five times the highest acceptable surface water bacteria listed in RSA 485-A:8, I, II, or V and not likely to result from sampling error. Additionally, such high levels are likely to cause surface water concentrations exceeding the criteria in RSA 485-A:8, I, II, or V. Confirmation of such concentrations shall occur before impairment determinations based on in-pipe bacteria concentrations.

Note: There are many instances in the state where agriculture stock piling of manure impacts the coliform count in a receiving waterbody. In Attachment 3, there is a picture of Army Corps land that is leased to farmers where several hundred ton of manure is stored along the shores of the Contoocook River (coordinates N 043-10-52. W 071-48-01. Alt. 236'). The storage area is approximately the size of a football field and loaded with manure up to two feet deep in most areas. This needs to be factored into any compliance considerations as it contributes immensely to e-coli violations in adjacent brooks.

Under section, Use: Aquatic Life, Manchester recommends a clarification to impoundments.

Definition: Waters that provide suitable chemical and physical conditions for supporting a balanced, integrated and adaptive community of aquatic organisms.

Applicability: All surface waters

Core Indicator(s):

Core Indicator(s)	**Applicable Surface Waters**
Biological based on benthic macroinvertebrates	Rivers/Streams $\leq 4^{th}$ order
Biological based on Fish Assemblage	Applicable Rivers/Streams
Biological based on at least 2 assemblages (fish and benthic macroinvertebrates) **OR** a minimum of dissolved oxygen, pH and documentation by a water quality professional trained in biology that there is no obvious impairment to the biological	All surface waters (fresh and tidal)

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community	
Chlorophyll-a	Lakes, ponds, & (impoundments if not similar to run of river
Total Nitrogen	Waters of the Great Bay Estuary

Note: This request is a result of the results of the Upper Merrimack River Watershed Study done by CDM and coordinated via the Army Corps of Engineers and the NHDES along with stakeholder communities. All the impoundments within New Hampshire exhibited characteristics of the run of river criteria and none of the characteristics of lakes and ponds. Concord's permit for phosphorus was set of the 25 ug/l limit for lakes for TP as Hooksett Dam was characterized as an impoundment. The study demonstrates that all impoundments act as run of river segments. This may not be true of all impoundments and that is why the wording is qualified.

In Indicator 1: Dissolved Oxygen (DO) the following comments are offered.

a. Samples must be taken during critical times of day (see Note 5c below) and seasons depending on the water type and use:

1) If the surface water is not a cold water natural reproducing fishery), at least 50% of the number of independent samples (i.e. n≥5) needed for FS, shall be taken between June 1 and September 30 (i.e., the critical season) and during the critical time of day. This is when DO is most apt to be lowest due to high temperatures and low flows. The remainder of the minimum number of independent samples needed for FS shall also be collected during the critical time of day but do not need to be collected during the critical season noted above. In cases where there are numerous non-critical season and non-critical time of day samples, the overall sample count will not be used to artificially increase the needed exceedences to exceed the binomial count unless samples were taken by a continuous oxygen data logger with documented calibration events.

2) In surface waters that are cold water natural reproducing fisheries, 100 % of the minimum number of independent samples (i.e. n≥10) needed for FS determination shall be taken between October 1 and May 14.

5- 17

2. Exceedances of the Water Quality Criteria for DO are defined IN Env-Wq 1703.07 as:

Applicable waters	**Daily Average Measurement**	**Instantaneous Measurement**
Class A: Applies to any depth	< 75% saturation	< 6 mg/L (+ 1/2 the meter error concentration in mg/l)
Class B: Applies to any depth in free flowing rivers and tidal waters and in the epilimnion (if stratified) or in the top 25% of depth (if not stratified) in lakes, ponds, impoundments and reservoirs.	< 75% saturation	< 5 mg/L (+ the meter error concentration in mg/l)

Applicable waters	Daily Average Measurement	Instantaneous Measurement
Note that DO in lower depths of lakes, ponds impoundments and reservoirs must support existing and designated uses.		
Class A or B cold water fish spawning areas whose early life stages are not directly exposed to the water (i.e., cold water naturally reproducing fisheries). Applies to any depth in free flowing rivers and tidal waters and in the epilimnion (if stratified) or in the top 25% of depth (if not stratified) in lakes, ponds, impoundments and reservoirs.	From 10/1 to 5/14, a 7 day mean DO based on the daily average of < 9.5 mg/L	From 10/1 to 5/14, DO < 8 mg/L (+1/2 the meter error concentration in mg/l)

3. Exceedances of the Magnitude of Exceedance Criteria (MAGEXC) for DO are defined as:

   Class A: DO < 5.5 mg/L (+1/2 meter error in mg/l) or <65% saturation

   Class B: DO < 4.5 – mg/L (+ meter error in mg/l) or <65% saturation

   Cold Water Fish Spawning Area (Class A or B): DO <7.5 mg/L (+1/2 meter in mg/l)

4. Data requirements for determining compliance:

   a Where DO is used as a Core Indicator, there must be sufficient data to indicate that all appropriate DO criteria are met (i.e., instantaneous minimum, daily average and in some cases, the 7 day mean as well) before DO can be assessed attaining water quality standards.

   b Preferred data/conditions for assessing DO:

      1) Compliance with instantaneous minimum DO concentration (mg/L) criteria shall be based on the minimum of a series of dissolved oxygen measurements taken at the same location and a maximum of one hour apart for 24 continuous hours except as noted in 5c below. High frequency datasonde measurements generally provide the most accurate and representative data.

      2) Compliance with average daily DO percent saturation criteria shall be based on the time weighted average of DO measurements taken at the same location and a maximum of one hour apart for 24 continuous hours except as noted in Note 5c below.

   c Other allowable data/conditions for assessing DO:

      1) For lakes, ponds, and impoundments:

         a. Stratification shall be considered present in a profile if the top to bottom temperatures differ by five or more degrees Celsius. Epilimnion waters are those parts of the lake within one degree Celsius of the temperature at, or

closest to (within 0.5 meter), the one meter depth. Visual interpretations of temperature profiles may override the automated procedures.

b. In Class B lakes, ponds, and impoundments, if preferred data is not available (see Note 5b), a lake may be assessed for compliance with DO criteria as shown below, provided that minimum value samples from the epilimnion for stratified lakes or upper 25% of depth for unstratified lakes respectively are collected from a profile taken between 10:00 and 14:00. (Source: NHDES, 2003b).

c. In Class A lakes, ponds, and impoundments waterbodies the bottom DO concentration shall not be used in assessments due to natural boundary layer conditions that result in decreased DO at the sediment to water column interface. Where the lake is greater then 3 meters deep, DO readings in the bottom 1 meter are not used. Where the lake is less then or equal to 3 meters deep, the deepest DO reading is not used.

Alternative DO Assessment Criteria for Lakes/Ponds

Use Support	**DO Class A (all time periods)**	**DO Class B (all time periods)**	**DO Any Class (Cold Water Spawning Period)**
FS	≥ 7 mg/L (- ½ meter error in mg/l) and ≥ 85% saturation	≥ 6 mg/L (- meter error in mg/l) and ≥ 85% saturation	≥ 9 mg/L (- ½ meter error in mg/l) and ≥ 85% saturation
Insufficient Information	≥ 6 mg/L but < 7 mg/L (- ½ meter error in mg/l and/or ≥ 75% saturation but < 85% saturation	≥ 5 mg/L but < 6 mg/L(- meter error in mg/l) and/or ≥ 75% saturation but < 85% saturation	≥ 9 mg/L but < 8 mg/L (- ½ meter error in mg/l) and/or ≥ 75% saturation but < 85% saturation
NS	< 6 mg/L (- ½ meter error in mg/l) or < 75% saturation	< 5 mg/L (- meter error in mg/l) or < 75% saturation	< 8 mg/L (- ½ meter error in mg/l) or < 75% saturation

2) For rivers/streams:

a. If preferred data is not available (see Note 5b), rivers/streams and impoundments may be assessed for compliance with the instantaneous minimum and MAGEXC DO criterion based on grab sample taken between 05:00 and 08:00.

b. If preferred data is not available (see Note 5b), rivers/streams and impoundments may be assessed for compliance with the 75% average daily saturation DO criterion based on a single grab sample as shown below, provided that samples are taken within the specified times shown.

c. Source: NHDES, 2003g.

Alternative % Saturation DO Assessment Criteria for Rivers / Streams and Impoundments

Use Support	Time of Single Sample	DO (% saturation)
FS	05:00 – 10:00 or 14:00 – 19:00	≥ 80% saturation or ≥ 90% saturation
Insufficient Information	05:00 – 10:00 or 14:00 – 19:00	> 45% but < 80 % or > 70% but < 100 %
NS	05:00 – 10:00 or 14:00 – 19:00	≤ 45% saturation or ≤ 70% saturation

Note: There is always concern regarding meter error, especially when meters are stored over long winters and not used for months then pressed into almost continual service. If the meter error is incorrect, other factors will manifest to make oxygen concentration secondary. FS saturation was changed from 100% to 90% as there may not be as much oxygen saturation on overcast days, or at times when there is little to no algae in the water body.

Table 3-4: - Use Support Matrix for Benthic Index of Biological Integrity, the City would propose the following changes to the classification table.

• Classification	• Benthic Index of Biologic Integrity	• Use Support
• Mountains	• ≥ 64.8	• FS
	<64.8 & >58.8	• PS
	• < 58.5	• NS
• Hills	• ≥ 58.5	• FS
	<58.5 & >53.1	• PS
	• < 53.1	• NS
• Plains	• ≥ 53.1	• FS
	<53.3 & >48.8	• PS
	• < 48.8	• NS
• Hybrid	≥ Weighted criteria	• FS
	< Weighted criteria	• NS

Note: As is indicated in Attachment 3, the IBI is a very subjective index. There is a point where four biologists actually each make their own subjective determination, based on their knowledge and skills then all come together to collaborate on a final IBI value. With this amount of subjectivity it is poor science to make a statement that at 64.8 designation for a water body is fully supporting and at 64.7 it is not supporting. There needs to be a partially supporting IBI designation and it is reasonable to have it fall between different classifications (as these are based on elevation).

5- 18

Manchester offers the following comments on note 1 regarding the above table.

1. Justification for the classification of macroinvetebrate community types, and respective benthic IBI criteria can be found in NH DES report WD-2011-8 entitled *Site classification using a non-linear predictive model in New Hampshire*, prepared by Benjamin Jessup and David Neils (2011).
2. Assessments shall be based on data collected in accordance with DES biomonitoring protocols, which include the deployment and collection of rock baskets during the summer months. A description of the protocols can be found in *New Hampshire Department of Environmental Services (NHDES) Protocols for Collection, Identification and Enumeration of Aquatic Macroinverterbates for Computation of a Benthic Index of Biotic Integrity (B-IBI)* (Draft June 2005).

Note: In Attachment 4, an inter-department communication from David Neils and Phil Trowbridge discusses the use of the predictive model. The introduction outlines the advantages and disadvantages of the Probabilistic model. The narrative states the advantage as statistics from the model can be used to make inferences about conditions throughout the resource. The method is a generalized flag to determine the probability of non-compliance. It outlines the disadvantage as citing that *"specific locations of water quality violations cannot be inferred from the statistical sample."* Mr. Neils further goes on to point out on page four, third paragraph down the following, *"The private contractor then took this information and constructed an objective non-linear, logic based (Fuzzy Set) model that predicted the BCG tier. The model was calibrated from regional reference and test sites (N-43), then applied to the remaining regional NEWS sites to predict each site's BCG tier assessment. As noted above the results given herein are presented solely for demonstration purposes and not intended for regulatory interpretation."* This quote reinforces the statement regarding the disadvantage of this model use.

The document further outlines some major discrepancies between sample collection methods. *"For aquatic life use support, the DES Biomonitoring Program assessed benthic macroinvertebrate data using a modified index of biological integrity (IBI). Placement of sites into aquatic life use support categories using macroinvertebrates was completed utilizing an assessment tool that differed from standard techniques outlined in the DES Condolidated Assessment and Listing Methodology (CALM; DES, 20006). Deviation from the DES' wadable stream aquatic life use assessment tool, as detailed in the CALM, was necessary because macroinvertebrate samples collected using the NEWS field protocols differed dramatically from standard DES field techniques."* This information is found on page three under Environmental Indicators.

The section continues to discuss calibration and recalibration to force fit the mergence of the models. *"The WSA IBI was subsequently recalibrated using regional reference sites from Maine, New Hampshire and Vermont. The threshold for Fully Supporting or Not Supporting aquatic life use categories was set at 68 out of a possible score of 100.... Low gradient streams for which biomonitoring data were collected were classified as Insufficient Information. The exclusion of low gradient streams from the probabilistic assessment differs from targeted wadeable stream aquatic life use assessments covered under the current DES CALM, but is consistent with the use and recalibration of WSA IBI. DES felt it was more important to be consistent with concurrent probabilistic data collection protocols and assessment indices than the assessment techniques developed specific to DES data collection protocols."* Previous to the writing of this document the CALM was the standard for biomonitoring protocol. After this memo it was the recalibrated

WSA IBI that was the standard biomonitoring protocol. If there is doubt in established models, how can there be such certainty in 68 being the cutoff for Fully Supporting vs. Non Supporting? For this reason it is important that another category of Partially Supporting be established.

Further on in this document there are a series of tables and graphs that establish the basis for the WSA IBI. Series 1, Aquatic Life Use Support outlines error of between 9.3% and 12.9% with Appendix A giving a confidence level of +/- 13%. Series 2 outlines error for Primary Contact Recreation of between 6.4% and 10% with Appendix A giving a confidence of +/- 10%. Series three, Secondary Contact Recreation is the best at 5.6% with an Appendix A confidence of +/- 6%. Almost all, if not all of the WQ criteria in NH is based on Aquatic Life support (as this is always the most stringent parameter). However with a 13% confidence error for this designation, it is hard to understand 68 is the break between Fully Supporting and Non Supporting when the confidence level is +/- 13%.

Also included in (Attachment 5) is the data support page from the 2009 CEI Reckenhow Model for Nutt Pond in Manchester. Include with this is the 2011 AECOM TMDL Model supporting data for Nutt Pond. NHDES staff were pleased with the results of Nutt Pond compliance and were using Nutt Pond as a success story. The AECOM 2011 model indicates the pond is far from compliance and not a success story. What has been the difference? The use of different modeling and different assumptions within the models. As CEI noted a 91% recalibration need in their model, what was the recalibration need in the AECOM model? This is not outlined anywhere, but falls in line with a minimum expectation for modeling as outlined in our 3.1.20 suggestions.

In January of 2004 a report was published titled, Development of the New Hampshire Benthic Index of Biotic Integrity (Attachment 6). This was prepared by the USEPA for NH. The EPA cites that the NHDES was primarily using a qualitative manner to make assessments and encouraged the NHDES to implement plans for developing numeric biological standards.

In this document (page 6) the EPA states use of the NMDS PC-ORD 4.0) MjM Sofware, Gleneden Beach, Oregon using an auto pilot mode. There were test solutions run though six axes to choose the solution with the lowest stress value. Axis 1 accounted for 32% variability and axis 2, 53% of the variability. Classification schemes were based on the U.S. Forest Service bioregions, Omernik Level III ecoregions or the The Nature Conservancy (TNC) scheme. These were evaluated by examining ordination plots and coded by class. It was determined that the TNC scheme provided the most promising classification. Here you have three varying products with three varying results. This is similar to the Five models that were averaged in the recent NH TMDL listings for Manchester's four Urban Ponds. Why were these three schemes not used and average results applied? As NHDES points out above it is more consistent and advantageous to work with one model than three or a composite of the three. This supports Manchester's earlier comments where we suggested that the most liberal predictive model be used for anticipated compliance purposes. This is why there is such a difference between the 2009 CEI model and the 2011 AECOM models for Manchester's Urban Ponds.

A detailed explanation ensues in the Index Assembly and Evaluation section. The results section states, *"Using calibration data, we found that DES were similar between the two scoring schemes, but varied among the index alternatives.... We selected the all sites scoring method because the variability associated with this method was generally lower and was lower with a larger data set."* The description further over views the use of the imhoff method vs. the caton method. The EPA states, *"These results indicate that, although there are differences between methods, using all of the data to set metric thresholds will provide a more conservative estimate*

of condition because the current method will tend to score lower. ***This means that index scores based on Caton method may tend to indicate that sites are in poorer condition than they actually are."***

The Future Work section states the following, *"At least partial re-analysis of metrics is required in order to incorporate additional Caton data and replace imhoff cone data in the development process. Currently, no repeat visits to sites are available to estimate temporal variability associated with the B-IBI. However, this is an important index feature which should be evaluated in the future. A specific effort to visit a random subset of sites multiple times within a year or over multiple years is necessary to address this issue."*

Note: Table 12 of this report outlines the Caton vs the Imhoff method for the southern region outlining scores worst through Best. Both methods scored 10 on the best (excellent correlation). The Caton scored 28 on the Good with the imhoff scoring 26 (a very good correlation). On the fair category the Caton scored 22 with the imhoff scoring 14 (a 57% variation which is a very poor correlation). Finally the worst category had a 10 for the Caton method and a 2 for the Imhoff method (a 500% difference which is an unacceptable correlation). This further supports the need to closely scrutinize any designation that was placed in the fair or worst category via both methods and to make the necessary field determinations to truly determine if impairment is exhibited. As you can see models and statistics vary widely.

The Caton tendency to designate sites in poorer condition than they actually are can cost municipalities millions of dollars. In Manchester's response to the MS4 permit we clearly demonstrated the financial ramifications from placing a poorer assessment on a water body than actually exists. Also included in Attachment 7 is the cost for Manchester Urban Pond compliance using the StormTreat Systems (a proven system that was very successful at Crystal Lake). The cost for unit installation around the City to meet compliance at all four ponds at 15 ug/l was a capital cost of $571,141,048 with an annual maintenance cost of $2,285,845. When the 20% safety factor is added in and the compliance target is dropped to 12 ug/l the costs increase dramatically to $766,649,420 (a $195 million dollar increase on the capital end) and the maintenance increases to $3,048,253 (an annual $762,408 in maintenance). This is a great demonstration of the cost associated with listing sites in poorer condition than they actually are.

In another NHDES document, NH Benthic Index of Biotic Integrity (B-IDI) for Wadeable Streams, 2006Threshold Modification to Account for natural Variation as prepared by David Neils (Attachment 8) more information is made avail on IBI methods. The introduction enumerates on the NHDES 8 metric index with a north bioregional criteria of 67 and a south bioregional criteria of 45 out of 100. The NHDES modified the index based on the EPA National Exposure Research laboratory to reduce the standard to 7 metrics with a bioregional criteria of 77 for the north region and 66 for the south. This is a 15% variation in the northern region and a 47% change in the southern region. The last sentence reads, *"While the revised B-IBI included the most responsive metrics and proved capable of discriminating between reference and test sites, the index did not make use of direct measures of natural variation within and between reference sites."* As compliance is almost always a site specific condition, it would be prudent to include measures of natural variation within sites.

The methods description details how standard deviation estimates were used to compensate for natural variation. Standard deviation accounts for a 90% confidence level and standard error. The last sentence reads *"The T-test statistic was then multiplied by the overall standard error to produce a 90% confidence interval of =/- 12 B-IBI points. This error was then applied to the B-IBI scores giving a 65 value for northern regions and a 54 value for southern regions (much closer to the NHDES original numbers).'*

Note: This example illustrates how a one-size-fits-all model approach is prone to subjective error. This exhibits a step to compensate for inherent errors in models and statistics for which NHDES should be commended.

Under Indicator 4, Biological Assessments (CWFA-IBI) the following appears as note five.

5. The CWFA-IBI score ranges from 9 – 45 and is the summation of 6 individual metrics including the percentage of generalist feeder individuals, the percentage of coldwater specialist individuals, the percentage of top carnivore individuals, the percentage of brook trout individuals, the number of tolerant species, and the age class structure of brook trout individuals. The threshold use support criterion of 27 was defined as the twenty-fifth percentile score of the reference condition (i.e., minimally impacted). Details of the development of the CWFA-IBI can be found in DES publication #R-WD-07-33 entitled "Coldwater fish assemblage index of biotic integrity for New Hampshire wadeable streams." (NHDES, 2007a)

In review of the Coldwater fish assemblage document (Attachment 9) one reviews statements that seem contrary to scientific interpretation. Page 11 has a statement, "*For Eastern brook trout (EBT) age class metric, a subjective decision was made to override objective measures of success and further consider it for inclusion into the final IBI.*" There is a lengthy discussion metrics prior to this statement and in Table 5 (just below the statement) under discrete metrics for the EBT-age-class metric there were only 33% correct with a 62.5% discrimination efficiency a poor correlation for metric inclusion with reason eing it was included in the VT DEC Coldwater IBI.

Item 4 (Percentage of Eastern Brook Trout) and 5 (Eastern Brook Trout Age Class) on page 14 outline that reduced percentages can be attributable to changes in quantity and quality of habitat, effects of acid deposition, thermal regime or other unknown human impacts. The presence or absence of young-of the- year (YOY) is an important attribute when assessing overall ecological integrity of biological communities. Yet we see from Table 5 that that the correlation is poor.

5- 19

Page 23, under Summary and Recommendations the following statement is made, "*The observed differences in reference and test site CWIBI scores were considered to be a reflection of locally induced human activities and the resultant impacts to overall ecological integrity of fish assemblage.* "

Note: As referenced earlier, there is a statement of acid deposition, thermal regime, unknown human impacts and in several sections of this document the effects of flooding with resultant sediment deposition from extensive erosion and the straightening of waterway bends where fish habitat.

A study in Alaska may shed some light on the belief that locally induced human activities and the resultant impacts to overall ecological integrity of fish assemblage. Alaska is a pristine environment with little to no impacts from human activity in most of that State. In an article from Alaska on a forum of the environment (Attachment 10) http://napaimute.org/2013/02/14/ak-forum-on-the-environment-middle-kuskokwim-fish-tissue-studies-and-fish-consumption-advisory-edition/ slimy sculpin environmental damage is not mainly caused by 'locally induced human activities', but from a variety of other impacts such as volcanoes, wild fires and pollutant discharge from Asian factories. The attached chart indicates that mercury is found in all tributaries within the area. As mercury is a ubiquitous element throughout NH waters and lakes, it is indeed possibly that it contributes to the YOY absence of EBT more so than 'locally induced human activities.' Page 26 states, "*For both states, (VT and NH) undisturbed coldwater streams have fish assemblages that are species poor....*" Is this due to the same factors as are experienced in Alaska?

Note: The document points out that another exercise is important when discussing top carnivores (trout). Whether or not the trout are a result of stalking or not. Page 25 points out that samplings

efforts should make attempts to distinguish stocked from wild fish. As stocked brown and rainbow trout are non-native reproducing species in NH waters, these may be predatory on lower level species reflecting an absence due to perceived 'locally induced human activities' when in fact it is due to numerous top carnivore predators. The document points out that the CWIBI does not distinguish between wild (i.e. naturally occurring) and stocked fish. It states that, *"However, based on experience, this oversight is not believed to be problematic as many of the reference sites are not commonly subjected to regular stocking and in all likelihood are supportive of naturally occurring individuals."* While this statement is subjective, the NH Fish and Game has a site that specifically lists the streams where stocking takes place during the fishing season and should be a point included in the CALM (http://www.wildlife.state.nh.us/Fishing/Stocking/current.html) as a reference source prior to electro-shocking and determination of top carnivore distribution.

When the CWIBI was applied to reference sites five sites fell below recommended criteria (19 percent). Manchester believes that an 81% accuracy is not high enough to establish an absolute IBI without applying a mid-level partially supporting category. The indices are used to determine aquatic life use status for the purpose of completing federally-required water quality reports, state-level regulatory actions, and general water quality planning activities. However, the document does point out what Hughes noted (2004) that *"natural disturbances, unrelated to human activity, can cause temporary impacts to ecological communities, and additional investigation may be warranted before formal aquatic life use, "impairment" listing."* In addition, Langdon (2001) outlines that future work on the CWIBI should include a more rigorous collection of life state (i.e. YOY, adult) data for the Eastern brook trout to improve the discriminatory power of that particular metric. When you consider the vast scouring of the benthic habitat from the Mother's Day flood, the Patriots' Day flood and the severe weather we have had over the past decade, it's hard to believe that natural disturbances have not caused additional natural disturbances

The above considerations should also support the establishment of the partially supporting index for the TWFA-IBI rather than the break off point of 28 or greater being fully supporting and <28 being non-supporting. There is too much approximation in the findings to set such a rigid cut-off point.

Indicator 6, Habitat Assessments Table 3-27 again sets absolute cut-offs for attainment of full use support. Again a partial supporting use should be designated for the gray areas between supporting and non-supporting. Note number one provides enough subjectivity in the process that illustrates a partially supporting criteria is necessary. Note one states, *"Habitat information for habitat scoring is collected when Bioassessments are conducted. Data is based on visual observations (subjective criteria for the viewer) using standard protocols and assessment sheets that address ten specific habitat parameters for low and high gradient streams. Habitat parameters include epifaunal substrate/available cover, pool substrate characterization, pool variability, sediment deposition, channel flow status, channel alteration, channel sinuousity, bank stability, vegetative protection, and riparian vegetative zone width. Each parameter was then given a score from one to twenty."*

5- 20

Note: These values were then compared to table 3-27 to determine use support. There are scores from one to twenty or 5% difference in each numeric separation. There are 10 categories to select from. If one person marks one lower in each of ten categories, it equates to 50% overall subjective variation between two biologists.

Indicator 7 elaborates on Chlorophyll-a (Chl-a) and Total Phosphorus (TP) in Lakes. There is no category or description for rivers, streams or impoundments. Yet increasingly, the lakes criteria is being ascribed to all water bodies. A sub indicator for these separate water bodies should be developed if this continues to be the approach.

5- 21

Indicator 11 outlines Stream Channel Stability. The reference notation is the 2005 "Providional regional hydraulic geometry curves for the State of NH (available in Schiff et.al., 2007). Severe flooding inundated the state on Mother's Day 2006, and Patriot's Day of 2007 along with other lesser severe storms since the 2005 reference date. Manchester noticed several channel erosion conditions upon inspection and clean ups after these storms in brooks leading to our urban ponds. We do expect that this is the case with numerous hydraulic profiles throughout the state. Has this 2005 reference been adjusted to account for the damage and vast channel changes from these subsequent storms?

5- 22

Table 3-32 outlines WQC for metals that were not taken with 'Clean Sampling Techniques' (CST). After Manchester's experience with CST during our Aluminum Study data gathering phase, we have seen the significant difference that in concentration between CST and careful non-CST methods. We used a modified method of sample collection for silver in the first decade of the 21st century. Careful wet-testing sample collection, not using all CST resulted in removing silver from Manchester's NPDES' permit. Manchester does applaud this approach as it does acknowledge the difference in results from the differences in sampling methods. Note six has the statement, *"These tables account for moderate levels of contamination (i.e. the Contamination Concentration) that are likely to occur when CST are not implemented."* As you can see in the table the metals range from a low of 0.54 ug/l for chronic freshwater lead to a high of 9,000 ug/l for acute freshwater antimony. Two samples fall within the range of 15 ug/l (TP limit). Hexavalent chromium has an acute criteria of 16 ug/l and is given an adjustment of 5.72 ug/l to 21.7 ug/l (a 26% adjustment). Lead has a freshwater acute limit of 13.88 ug/l and is given a 4.25 ug/l adjustment 18.1 ug/l (a 23% adjustment).

5- 23

Note: TP levels are within this threshold, yet no allowance is made for non-CST criteria. If anything, samplers are exposed to much higher levels of TP than they would be to metals. Walking across a lawn that has had fertilizer applied to it is likely to result in residual fertilizer adhering to shoes, pants and all clothing. This residual concentration is likely to go up in windy conditions. This is why an allowance for non-CST sampling should be given for nutrients as it is being given for metals.

Indicator 10, Flow assessments note two, states that, *"Any AU within which there is a designated segment that is not meeting the General Standard in any month in the previous ten years will be assessed as Potentially Non-Supporting."*

Note: As sampling results go back five-years for river segments, there should be some continuity that follows for flows also stating the data will go back five years to be more representative of more current conditions.

5- 24

Respectfully submitted,

Ricardo Cantu
Superintendent

Cc: Fred Mc,Neill, P.E.

COMMENT # 6: Merrimack - Richard S. Seymour, Jr. - Public Works Department - Director

TOWN OF MERRIMACK, NH

6 Baboosic Lake Rd · Merrimack, NH 03054 · www.merrimacknh.gov

October 10, 2013

Water Quality Data
NHDES – Watershed Management Bureau
PO Box 95
Concord, NH 03302-0095

6- 1

On behalf of the Town of Merrimack, NH, we offer the following comments and questions regarding the draft NHDES 2012 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology, dated July 2013.

1. In Section 1.1 "Purpose", of the CALM it is noted that surface waters will be included in the 303(d) list if they (as noted in #2) are "not expected to meet water quality standards within a reasonable time even after application of best available technology…etc.). What is considered to be a reasonable time frame, and how is it to be determined?

2. In Section 1.2.2 "Integrated Approach for 305(b)/303(d)", it is noted that surface waters are placed in one of seven categories. There are only 5 categories listed in this section. What are the other two categories?

6- 2

3. In Section 3.1.10 "Data Quality" Table 3-8 "Level of Information Descriptions for Data Quality", it is noted that information that is noted as being of a "Fair" level may be utilized to develop a final assessment of the data quality and presumably be utilized in developing a Total Maximum Daily Limit (TMDL) for a water body. A description of the data that causes it to fall into the "Fair" category is that the Standard Operating Procedures (SOPs) and QA/QC procedures need to be available only. It does not note that these SOPs or QA/QC plans need to be considered acceptable or approved as in the category of "Good" information. Also, the samplers (individuals) who are collecting the data need only have a limited amount or as noted in Table 3-8 "some training". Clearly the lack of an approved SOP or QA/QC and the use of sampling staff that has only limited training puts any data collected in the water body and categorized as "Fair" as suspect and of very limited or useless value. The "Assessment Applicability" should note that any "Fair" data be used only for screening level assessments or not at all.

6- 3

4. In Section 3.1.11 "Data Age" it is noted that the maximum age for data use in assessments is 5 years for rivers, streams, impoundments, estuaries and oceans. It also notes that for lakes and ponds the maximum data age is 10 years. We feel that the maximum year numbers are arbitrary and not applicable. For example, a surface pond may be fed from various different and multiple sources such as natural springs or streams. This is also true in streams where the dynamics of a stream vary by size, speed, temperature, terrain, depth, etc. The dynamics of one water body as compared to another are going to be different and as such the data used to assess that body needs to be of an age that corresponds exactly to current conditions.

6- 4

5. In Section 3.1.12 "Values Beyond Detection Limits", it is noted that "When non-detect values were reported and an actual value was needed for an assessment, 50% of the analytical detection limit was used as the value." When averaging data, using half of the detection limit can mathematically skew the results to a false conclusion. If a data point is found to be less that the detection level, the value of the data should be recorded as zero and the zero should be used in the final averaging.

6- 5

6. In Section 3.1.17 "Minimum Number of Samples – 10 Percent Rule, it is stated that "the 10% rule means that at least 10% of the samples must violate water quality criterion before a waterbody will be listed as impaired." We feel that the 10% rule is very restrictive and not defendable. There are many factors that can cause a high concentration spike in a sample, especially in a dynamic water body. These could include, improper sampling, particulate anomaly, improper sampling, sediment disturbance, etc. Any of these factors should not be utilized in determining that a water body is impaired. Clearly a higher percent of samples need to be in violation in order to move to an impairment listing and eventual TMDL imposition. We agree as noted in this section that it is very important that as many samples as possible be collected. Also, we agree that some error is introduced into sampling and that more sampling always gives a better picture of actual current conditions.

6- 6

Please feel free to call or contact me if you should have any questions or comments.

Sincerely,

Richard S. Seymour, Jr.
Director

CC: Eileen Cabanel, Town Manager
Kyle Fox, Deputy Director

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